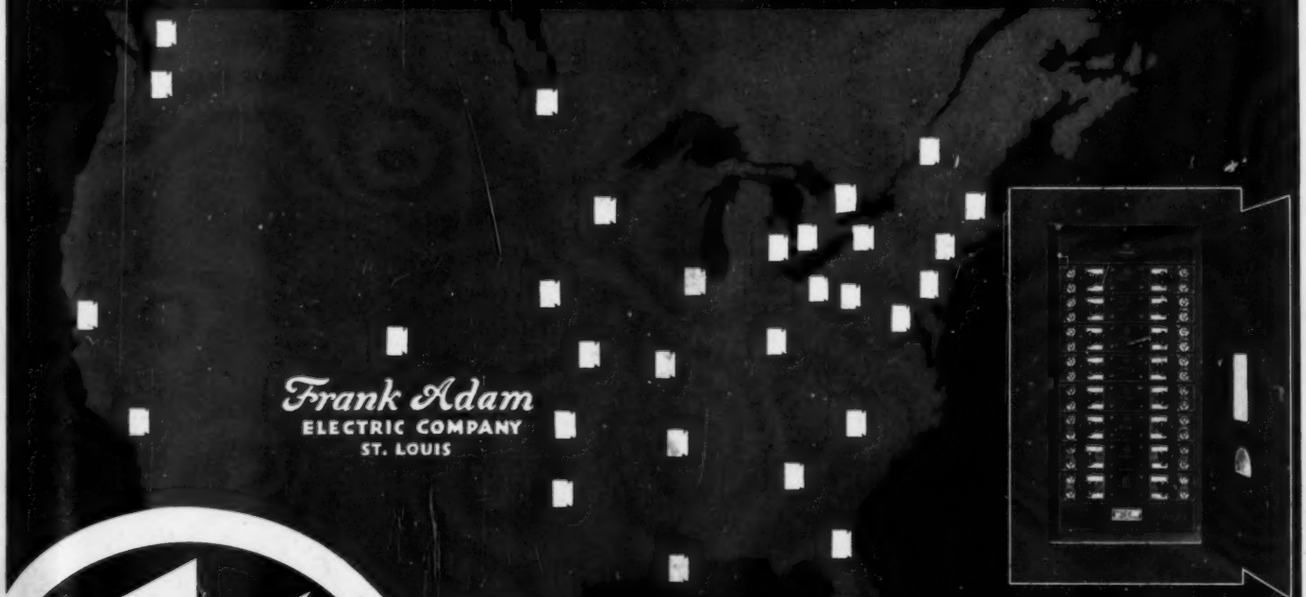
The Electragist

TRADE MARK REG. U.S. PAT. OFFICE

Vol. 27, No. 10 — Association of Electragists INTERNATIONAL — AUGUST, 1928

With FA standardized panelboards you get service from experienced FA panelboard men in an office near you-supplemented by jobbers' stock of steel cabinets in your neighborhood wherever you are



FA TRADE MARK Panelboards *are the Sign of a Better Job*

A Switch *and* Outlet in one Unit

Simply turn the outlet to switch on the current

It's handier . . handsomer
it saves wiring time . . wiring material

To please your customers . . . to get more profit from every job—install the Hubbell "Switch-Tap."

Combining switch and outlet in one unit, the "Switch-Tap" possesses an appealing feature of handiness. A quarter turn of the "finger-grooved" outlet controls the lights. The Te-Slots—always alive—accommodate any appliance. Covered by the Hubbell Screwless Bakelite Plate —*exactly matching any finish of wall or woodwork* —the "Switch-Tap" has a distinctive appearance that makes it easy to sell.

A simplified wiring job allows more profit for you on every "Switch-Tap" installed. Only one device to mount and wire. Only one BX needed. Only one single outlet box. Only one single plate — merely snap it on. No looping — less skinning — less wire.

Hubbell "Switch-Taps" give your customers a handier . . . handsomer device. *And they give you added profit.* Investigate this time, labor and material saving device. Send the coupon—Now.

HARVEY HUBBELL, Incorporated
BRIDGEPORT, CONNECTICUT, U. S. A.

HUBBELL *Switch-Taps*

Mail coupon to our nearest office
Bridgeport, Conn., Main Office

Boston, Mass
176 Federal St.

Atlanta, Georgia
138 Marietta St.
H. C. Biglin

Baltimore, Md.
216 E. Lexington St.

New York City, N. Y.
30 East 42nd St.

Chicago, Illinois
318 W. Washington St.

Denver, Colo.
1109 Broadway
The Sales Service Co.

Philadelphia, Pa.
Fifth St. —
Philadelphia Bourse
(Exhibition Dept.)

San Francisco, Cal.
390 Fourth St.
Garnett Young & Co.

Please send information on "Switch-Taps"

Name _____

Address _____

City and State _____

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THE ELECTRAGIST, August, 1928, Vol. 27, No. 10, $2.00 per year, 20 cents a copy. Published monthly at 100 Liberty Street, Utica, N. Y. Association of Electragists—International, 15 West 37th St., New York, N. Y. Entered as second class matter September 1, 1919, at the Post Office at Utica, N. Y., under the act of March 3, 1879.

The Electragist

(The National Electrical Contractor and The Electrical Contractor-Dealer)

Official Journal of the Association of Electragists—International

Vol. 27 AUGUST, 1928 No. 10

Outbursts, Suggestions, Criticism

To the Editor

Written by the Readers

Leagues

THE idea of local Electrical Leagues, with members drawn from all branches of the industry, is growing, often developing differently in the various localities. How best can the league serve the industry? What should be the contractor's relation to the league, and vice versa? These are interesting questions, on which the editor of The Electragist would like to have your opinion. What do YOU think?

League Domination

That was a mighty good editorial on "League Domination" that you had in your June issue. Everything you said in it was certainly pertinent. Any of us who are in this work and who have been in co-operative development work in other industries, know that it is fundamental that no one group should dominate the organization.

As far as Kansas City is concerned, I am very happy to say that we have a splendid central station outfit and they have never attempted and I do not believe they ever will attempt to exercise any domination of our organization. The officers are very broadminded men and I know they are in hearty sympathy with the thoughts expressed in your very able editorial.

G. W. Weston, Secretary,
Kansas City Electric Club.

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Motor Repair Men

The repair shop man needs to know considerable about design and construction of all kinds of electrical apparatus both theoretical and practical. When employed as a so-called "trouble shooter," he must be a man with more or less detective or deductive type of mind, as motor troubles are quite frequently very complicated and many times would tax the ability of a regular Sherlock Holmes. On the other hand, this same type of man usually does not work out well on installation work. From our experience in the past, we usually found he was very much slower on a construction job and was a poor man for planning and keeping the whole job in mind with the result that there was a lot of lost motion and effort.

There are, of course, exceptions to the above and you will find a man who will work out well with either class of work. Even such men are bound to lose speed as there is nothing like continual pounding away at the same thing to increase speed and efficiency.

Another feature to consider is that many men do not like inside work, even though they have the ability and skill to do shop work.

I have talked with other employers operating mixed crews and their experience has usually been the same, that it is not practical to try to have the same man cover the two different classes of work.

There is also the problem of the peak load in the two different departments coming at the same time, so such a scheme of mixing work does not always work out to the best advantage.

Our experience has been that the best slack time proposition for the repair shop is to handle rebuilt machinery and use the shop men on rebuilding work when repair work is slack. With such an arrangement, the problem of training new men is reduced to a minimum as the shop men can be guaranteed all-year-round work. New men need only be added as the business grows. Such men can be trained in your own shop under your own supervision and our experience has shown that new, inexperienced apprentices make the best material for developing shop men.

Some of the trade schools are turning out good material for shop men, as they give them a preliminary training in the theory of electrical machinery and enough practical work of various kinds so the student can decide which field of electrical work appeals most to him. We usually start such beginners on coil work and gradually let them work into winding of the simpler sort. Their advancement from then on depends entirely on their natural ability and skill.

Boustead Electric & Mfg. Co.,
George P. Svendsen, President,
Minneapolis, Minn.

Apartment vs. Residence

We recently were asked to figure on two apartment house jobs. These are constructed on the order of ten and fourteen individual homes with main living rooms on first floor and chambers on second floor, tile walls separate each residence from the next, each residence though adjoining is sold to individuals and each has his complete home system. We were to figure armored cable as no outlets were to be installed in masonry walls. After entering the bids the builder said we should figure on knob and tube work, except service and sub mains. We took the stand that this was an apartment building and must be wired in conduit (flex or rigid) but our chief electrical inspector declared they were the same as ten and fourteen separate isolated houses since a tile wall separated each apartment from the other. What is your version of this case?

R. W. Heald,
Nagle & Heald,
Waterloo, Iowa

Answer: Both the old Code and the 1928 edition permit either conduit, armored cable, or knob and tube work to be used in both residences and apartments. I presume that you have in mind the requirements of your own city ordinance and as we haven't a copy of this I am unable to advise as to its interpretation. In general I believe that the type of building you describe would be considered as a collection of single-family residences and not as an apartment, in which case the rules applying to residences would, of course, apply to this building.

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Utility Publicity

I have read with interest the editorial in the July number headed, "Millions for Propaganda". I have seen such headings in some of the daily papers, from time to time.

The statement is grossly incorrect. Much of what the papers call propaganda, and which is not propaganda in its generally accepted sense, is a very great factor in bringing the public utilities to a point where they can get from the investing public the necessary funds to enable them to grow and keep pace with the demand. If they could not get these funds and did not grow, the manufacturing business and the contracting business would be among the greatest sufferers.

Then again, I know what is being spent in some of the larger utilities, and I think they are typical of all of them, and they are spending many times more money in the development of an electrical market than they are in the kind of publicity which the Federal Trade Commission has been interested in.

John F. Gilchrist, Vice-president,
Commonwealth Edison Co.

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Cost Plus Jobs

Have you special forms for "cost plus" jobs? If you have not, could you advise me where to get some useful ones?

Edward Rousseau,
Jewett City, Conn.

Answer: It is not customary for a contractor to employ special systems of cost keeping for cost-plus jobs which are different from the system used for contract jobs. It is much better to use one system for everything, because the use of two systems for two kinds of jobs would lead to considerable complication in your office records and would probably be the cause of a good many errors.

We have two sets of forms on cost keeping, the more simple system and the one which we recommend to the contractor whose business consists principally of small jobs or "jobbing-work" requires the use of our time cards, Form 2, and our job sheet, Form 50. Each workman fills out a time card for each day and turns this in, preferably at the close of each day. The material taken out to the job and returned from the job is entered directly on the job sheet. The labor is entered on this sheet from the time cards so you can easily see that this sheet forms a complete record of the cost of the job.

For the contractor who has a considerable amount of larger work we recommend the job envelope system. For this we furnish a special envelope about 9″x11½″, on the face of which there are two columns for entering the labor and for entering the totals of material charges and material credits from Form 1 and Form 3. These forms and other papers pertaining to the job are filed inside the job envelope.

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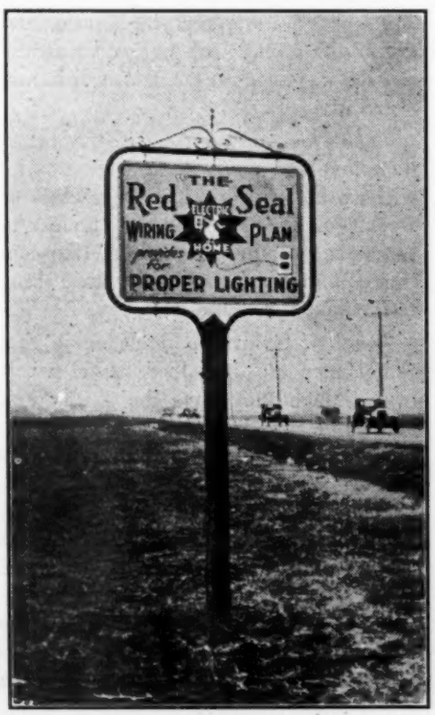
Code Analysis

I think your analysis of the new 1928 National Electric Code is a fine job, at least so far as the grounding section is concerned. The rest of it I don't know a great deal about.

S. W. Borden,
Borden Electric Co.
Newark, N. J.

Signs to Advertise Red Seal

A NOVEL and effective means of advertising the Red Seal plan is illustrated here. These signs are to be seen on the highways in the territory of the Chicago Electric Association. About 40 of them are located on the main highways leading into Chicago from the west and others have been placed on the south and north roads. They are usually located in pairs, so that one is seen on entering the city of Chicago, the other on leaving it.



Motor Repair Men

By THE OWNERS OF 60 MOTOR SHOPS

SIXTY owners of motor repair shops gave these answers when questioned by the editor of THE ELECTRACIST. They were practically unanimous on every point. Nearly all said that repair men could not be used on installation and construction work; nor on the other hand could wiremen be used for motor repair work.

It requires a different type of man for the careful detailed work of motor repairing. Some men are born with a knack for careful mechanical work indoors in a shop; others want to be out in the air in a new building running conduit. And neither man can do the kind of work he dislikes as fast and efficiently as the work he likes.

George P. Svendsen, president of the Boustead Electric and Mfg. Co., Inc., of Minneapolis, Minn., who has made a careful study of workmen and how to select them, states:

"Our company has not done any electrical installation work for some years, but at that time we found that the installation man usually made a poor shop man and vice versa the motor repair shop man usually was a poor installation mechanic. The two jobs require entirely different types of mechanics. Repair shop work requires considerably more patience and the ability to do considerable repetition work and at the same time a high grade of manual skill and dexterity is needed."

1—Can the same mechanics be used for motor repair work as are used for installation work? No.

2—If not, why? Too slow.

3—Do repair men make good installation men? No.

4—If not, why? Too slow.

5—How do you train repair men? In our own shop.

6—How long should the training period be? Up to 10 years.

7—Do you find that one with no electrical experience or an experienced wireman is the best for training in the repair department? No experience.

8—How do repair men trained by manufacturers measure up with those trained in local shops? Local shop men best.

Most motor shop owners prefer an inexperienced man, usually a boy, who can be trained in the shop just the way they want him. A few favor graduates of industrial or technical high schools who know the fundamentals of electricity and something about mechanics, and many say that the the boy must not only learn in the shop but must also read and study outside to get the principles as well as the actual practice.

Explaining that he prefers to train men without previous experience, one motor man says: "Wiremen think they know too much and can be taught motor repairing only with difficulty."

The training is usually along the lines of the apprentice system, the boy acting as a helper to the experienced men in the shop until he learns to do everything himself.

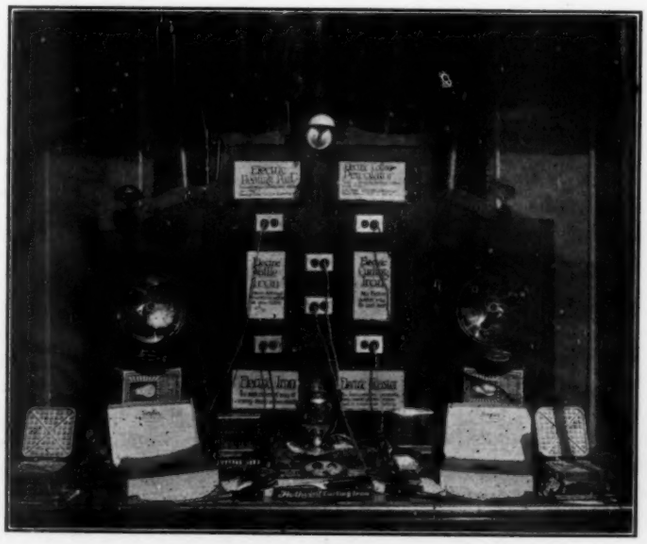
The proper period for the training apparently runs from 2 to 6 years, most motor men preferring to train men for four years. Venino Brothers & Co., Inc., Newark, N. J., likes to train a man for 5 to 7 years, and sometimes 10 years. This company, according to O. Venino, finds that a boy who passed through an industrial school is better equipped than one with no training at all. These boys learn somewhat faster, and are good mechanics within 5 to 7 years; if they have had no electrical study at all it takes 10 years.

Venino Brothers have a regular course for their apprentices, as follows: "When a boy is employed by us he must start by serving in the stock room, to familiarize himself with all the parts from the stock room to the coil room, winding all types of coils, and from the coil room right down into the main shop, where they are trained to install these coils and do motor work. From the shop they are sent out as trouble men, and finally every man is given a chance in our testing room."

Some motor shop owners say that the repair men turned out by manufacturers make good employes, but by far the majority do not like factory trained men at all. They say that factory men are trained on only one make of motor or on only one detail of the motor and are not adaptable or useful for shop work. Most motor men prefer either to train their own employes from boy apprentices up, or take experienced motor repairmen who have been trained in other motor repair shops.

A Contractor's Window

AN effective way of telling the public that he installs convenience outlets as well as sells electrical appliances is used by Otis Hawes, of the Hawes Electric Co., Watertown, Mass., in this display window. Convenience outlets are prominently located on a board background, and wires lead from the outlets to appliances in the front of the window.



Accounting Forms Should Tell a Real Story

Analysis Forms Used Correctly Tell an Important Story to the Electrical Contractor Who Wants to Know What He is Doing

THE purpose of accounting is not to provide several bookkeepers with work and an income but to give information to the owner of the business so he knows where the bright and the bad spots are, thus enabling him to correct them. The keeping of books showing income, expenses, sales records, etc., is particularly useful if periodic analysis is made of the records. Where a contractor runs both a contracting and a store business it is essential that he analyze his records to learn whether both departments of the business are profitable, as it is quite likely that one branch may be making money while the other is losing it.

W. H. Ochiltree, president of the Ochiltree Electric Company, Pittsburgh, Pa., not only keeps accurate records and accounts but also analyzes those records frequently to see what his business is doing. The forms shown in this article are used by Mr. Ochiltree to study the departments of his company and take necessary action.

Fig. 1 is the Analysis of Sales. One of these reports is made out each month, and this contains not only the figures for the month but for the year to date. The latter figures are, of course, obtained by adding the sales for the current month to those of the year-to-date on the previous month's analysis. The sales are divided into wiring, fixtures, refrigerators, lamps, supplies, radio, art, appliances and all others. By looking at the analysis sheet for the same month of the preceding year, Mr. Ochiltree can learn if his sales have improved; he can also compare the sales of each department for the year-to-date with the preceding year-to-date. This sheet also contains spaces for the summary of the various operations by departments.

Fig. 2 is the Summary of Operations. One of these reports is made out each month and this also shows the operations for the year-to-date. On this form the Ochiltree company divides the business into two departments: Contracting and store. From this sheet, weak spots can be located and corrected before it is too late. For instance, the cost of sales may be too great in the store, as compared with the contracting department; sales may be weak in one department; or returns and allowances may be heavier than proper. These bad conditions, brought to light, can be remedied at any time during the year, without waiting for the annual statement at the end of the fiscal year.

Fig. 3 gives Details of Operating Expenses. This form is made out at the end of each month and provides for all store and office expenses as well as for other general expenses which are charged 50 percent to contracting and 50 percent to the store. By studying this form in comparison with the same month the preceding year and the same period of the year with the same period of the preceding year, the president can see where the weaknesses are. If his postage and telephone expense has greatly increased, without reasonable cause, something is quite evidently the matter; he can check to see if employees are using the telephone for personal calls or if stamps are being stolen. This detailed analysis of expenses often brings bad situations to light.

Fig. 4 is the Balance Sheet. This form is made out monthly and shows the balance sheet for the month as well as that at the beginning of the fiscal year. This is a very important form in the analysis of the business. By comparison with the figures for the beginning of the fiscal year the trends can be studied and dangerous ones stopped before they go too far. It is important to watch "accounts receivable" to see that they don't get too large, indicating that collections are not being made promptly.

With these four forms a good analysis of the business can be made each month. Sometimes as a result of such a system the contractor will find it profitable to drop certain departments or encourage others more heartily. Often more profit can be made on a smaller volume if deadwood and unprofitable parts of the business are cut off.

All these forms are kept on loose-leaf sheets which are easily filed. The Ochiltree Electric Company does not use printed forms but makes up its own forms to suit its particular business and has them multigraphed in advance. The forms measure 8½ in. by 11 in.

As a result of these analysis charts, the Ochiltree Electric Company has abandoned all departments except contracting and refrigeration.

Collection Aids

E. W. McKinney, president of the Electric Service Co., New Orleans, La., believes that one good method of aiding collections is to meet as many customers as possible personally. This enables him to go after collections with an understanding of the personality and characteristics of the customer, with the consequence that collection tactics are more effective. Mr. McKinney telephones many past due accounts and has found this a very effective method of bringing in the checks.

Honest business methods, and fair dealing with customers, Mr. McKinney feels, are the best collection aids, and for this reason he makes use of a national resale price service for billing material for jobs on a cost plus basis. This system, he says, keeps customers satisfied because it enables the contractor to have daily quotations and if the customer questions the charge the contractor can show that he is keeping pace with changes of the market and charging correctly.

OCHILTREE ELECTRIC COMPANY

Pittsburgh, Penna.

Analysis of Sales for _____ 192_.

ANALYSIS	For Month of Billing	For Month of Gross Profit	For Months ended Billing	For Months ended Gross Profit
Contracting				
Wiring - billed				
Wiring - unbilled				
Fixtures - billed				
Fixtures - unbilled				
Coldair - billed				
Coldair - unbilled				
Total Contracting				
Store				
Lamps				
Supplies				
Radio				
Art				
Appliances				
All Other				
Total				
Service				
Total Sales				

SUMMARY OF OPERATIONS BY DEPARTMENTS	STORE Month of	% of Net Sales	Months to Date	% to Net Sales	CONTRACTING Month of	% to Net Sales	Months to Date	% to Net Sales
Net Sales								
Cost of Sales								
Gross Profit								
Operating Expense								
Net Profit on Sales								

Fig. 1

OCHILTREE ELECTRIC COMPANY

Pittsburgh, Penna.

Summary of Operations for _____ 192_.

	For Month of 192_	% to Net Sales	For Months ended 192_	% to Net Sales
SALES				
Contracting Department				
Store				
Total				
RETURNS AND ALLOWANCES				
Contracting Department				
Store				
Total				
Net Sales				
COST OF SALES				
Contracting Department				
Store				
Total				
Gross Profit on Sales				
OPERATING EXPENSES				
Contracting Department				
Store				
Total				
Net Profit on Sales				
OTHER INCOME				
Discount Earned				
Rentals				
Auto				
All Other				
Total Other Income				
Total Earnings				
DEDUCTIONS				
Discounts Allowed				
Interest on Payables				
Discount on Accounts Sold				
All Other				
Total Deductions				
Net Income for Period				

Fig. 2

OCHILTREE ELECTRIC COMPANY

Pittsburgh, Penna.

Details of Operating Expenses for _____ 192_.

STORE EXPENSES	For Month of 192_	% to Net Sales	For Months ended 192_	% to Net Sales
Salaries				
Commissions				
Advertising				
New Business				
Rent				
Light, Heat and Water				
Stationery and Office Supplies				
Postage and Telephone				
Freight and Express				
Cartage				
All Other				
Total				
OFFICE EXPENSES				
Contracting				
Salaries				
Stationery and Supplies				
Freight and Express				
All Other Direct Contracting Expenses				
Total				
General				
Salaries				
Light, Heat and Water				
Postage and Telephone				
Stationery and Supplies				
Insurance - Burglary				
Association Dues				
Cartage				
Traveling and Entertainment				
General				
Total				
Total Office Expenses				
Total Operating Expenses				
SUMMARY OF EXPENSES				
Contracting - including 50% Genl. Office Expense				
Store - including 50% Genl. Office Expense				
Total				

Fig. 3

OCHILTREE ELECTRIC COMPANY

Pittsburgh, Penna.

Balance Sheet as of _____ 192_.

ASSETS	At this Date	At beginning of Fiscal Year
CURRENT		
Cash		
Notes Receivable		
Accounts Receivable		
Regular		
Leases - Not Sold		
Miscellaneous		
Advances		
Ohio Contract Purchase Corporation		
Merchandise		
Total		
FIXED		
Furniture and Fixtures		
Auto Equipment		
Tools and Equipment		
Alterations and Improvements		
Total		
DEFERRED CHARGES		
Insurance		
Taxes		
Interest		
All Other		
Total		
Total Assets		
LIABILITIES		
CURRENT		
Accounts Payable		
Notes Payable		
Total		
RESERVES		
For Bad Debts		
For Depreciation		
Total		
CAPITAL AND SURPLUS		
Common		
Preferred		
Surplus Deficit at beginning of period		
Profit for period to date		
Net Surplus Deficit		
Total		
Total Liabilities and Capital		

Fig. 4

Four Simple Accounting Forms Used in Monthly Analysis

Estimating Methods---XIV

Store Layout
Job Factor Calculation
Pricing Sheets
Circuit Schedules
Show Window Circuits
Call Bell System

By ARTHUR L. ABBOTT
Technical Director, Association of Electragists, International

THE small brick and frame construction commercial building is built in such large numbers in all cities and towns that it becomes an important source of business for the electrical contractor. Although the individual jobs are not large, on account of the aggregate volume of business this type of building represents, the methods of estimating and handling this class of work are worthy of careful attention.

Plans are shown here for a typical small store building 122 ft. long x 40 ft. 6 in. wide (outside dimensions) with a second floor extending back only 21 ft. from the front of the building. The height from floor to floor is 9 ft. 9 in. in the basement and 15 ft. 3 in. on the first floor, and from the floor of the second floor to the ceiling the height is 9 ft. 1 in. The basement is used for storage only and is unfinished. The outside walls are brick, furred with 1¾ in. strips and lathed and plastered on the first and second floors. The first floor has a steel ceiling.

There is an open space between the roof timbers and the ceiling joists over the second floor, and a similar space over the first floor except the front 21 feet over which the second floor extends.

The electrical layout is much more complete and elaborate than is commonly found in buildings of this type, being planned by a competent engineer for efficiency and economy in the general operation of the store. Most of the basement is occupied with storage bins. Lighting is provided in the aisles between the bins and each group of outlets is controlled by a pair of 3-point switches. Special outlets for fans are provided on the walls of the first and second floors and at one location on the ceiling of the first floor. Complete wiring and equipment for show window lighting is provided, these circuits being supplied from a special panelboard fed through a time switch. There is a small office on a raised platform at the rear of the store. From three push-buttons in this office wiring is installed in conduit to a gate opener, a bell on the first floor and a bell on the second floor. A 3-station intercommunicating telephone system is also provided.

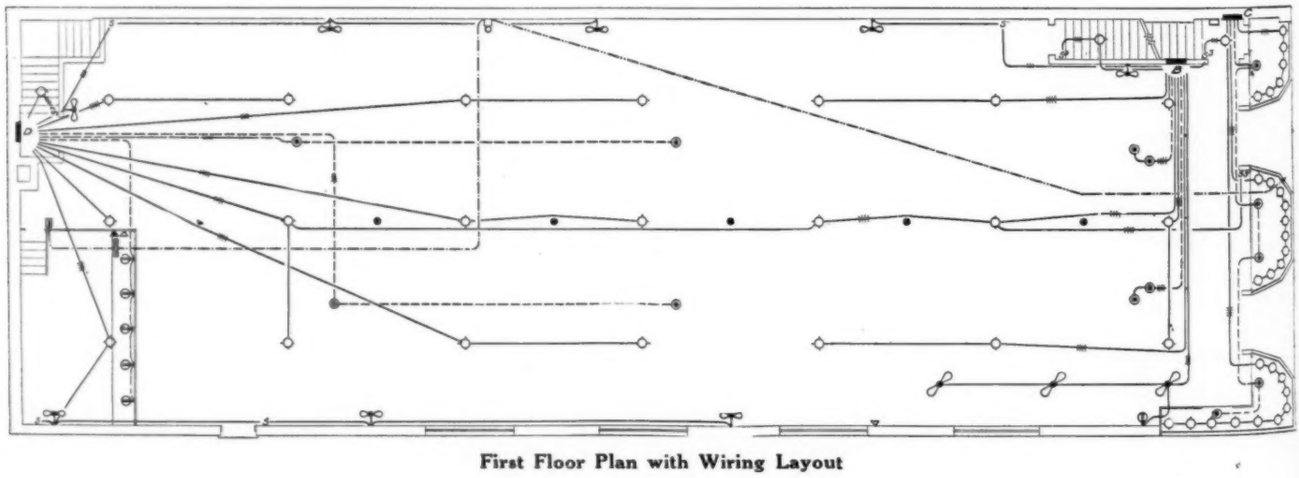
The service enters the side of the building near the rear and runs to a main distribution center, from which four feeders are installed, one to each of the lighting cabinets. All wiring is in rigid conduit except that armored cable is used for connecting between the outlets for show window lighting.

The plans furnished by the architect showed only the location of the outlets and cabinets, the switch control wanted and the grouping of the outlets on circuits. The first step in making the estimate is to lay out the branch circuit work on the blueprints, using a yellow pencil. The estimating layout will of course be much less elaborate than that shown here but must be complete enough to show all runs, conduit sizes and size and number of wires in each run.

The complete listing of material and the labor estimate are shown on the form sheets Nos. 1 to 6 inclusive.

Before beginning to take off the material quantities it is noted that the basement work is all exposed on wood construction; also that there is an open space above the ceiling of the second floor and above nearly all of the ceiling of the first floor, the construction being that classified as D4 in tables 7 and 7A. For both the exposed work and the concealed work we can use the simplified method and do not need to count the pipe entrances.

The conduit lengths are taken off with the rotometer in the usual way, the outlets are counted and all quantities



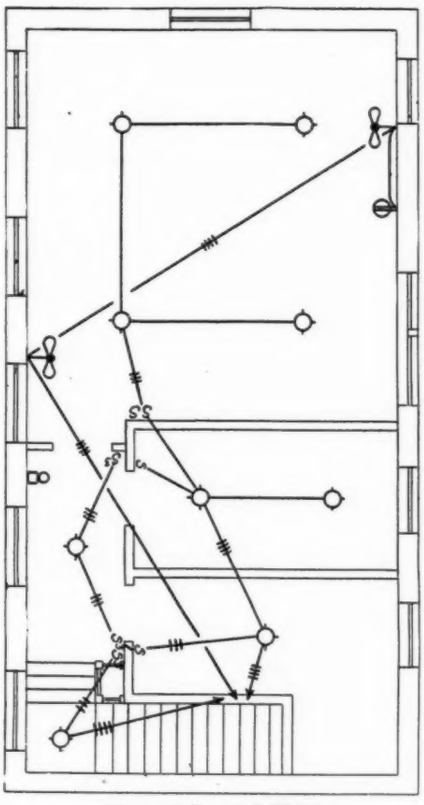
First Floor Plan with Wiring Layout

are entered on Form 1-E (sheet No. 1). The size of conduit used for four No. 14 wires will depend upon the specifications; in this case ¾ in. was figured for four or five No. 14. The lengths of runs containing two wires and of those containing three wires were scaled off together and the total lengths for each floor were entered in the column on Form 1-E headed ½"-2. In the same manner the ¾ in. conduit was taken off as a single quantity, regardless of whether the runs contained four or five wires. The length of "odd" wire was then measured by again running the rotometer over all runs containing three or five wires.

The specifications called for certain branch circuits to be No. 12 wire. The total length of this size was scaled off and found to be 366 ft., though on such a job as this where it is apparent that only a small amount of No. 12 will be needed the length can just as well be roughly estimated without using the rotometer. On a large installation where there is a considerable quantity of No. 12 or No. 10 the sizes can easily be kept separate in the conduit take-off.

After the entries on the form have been totaled and allowances on conduit and wire have been added, the outlets are totaled on the lower part of the sheet. The total length of wire is computed in the space provided for that purpose in the lower left-hand corner and the allowance for No. 12 is deducted to find the quantity of No. 14.

The space in the lower right-hand corner of the form may conveniently be used to tabulate the wall outlets and separate the outlet boxes from the condulets. Here again, on a very large and complicated job, there may be a dozen or more types of outlets and the number of each type should be counted and set down in a separate column.



Plan of Second Floor

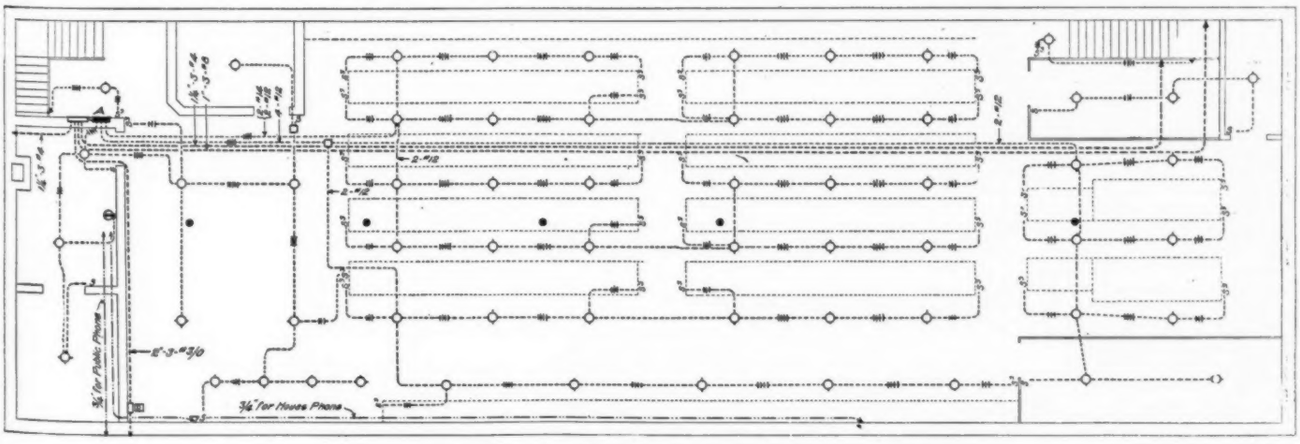
The job factor calculation may also conveniently be made on this sheet. This being a wood frame construction building, the area to be used in finding the size factor is the total area of the three floors. Referring to tables A and C in Installment VII (January, 1928) for the given area of 9920 sq. ft., we take the figure for 10,000 sq. ft., 12.5 percent. For a small store building the layout factor is 3 percent. On a small building of this class the general contractor has less opportunity to make trouble than on a large fireproof building and we may use a low figure here; to bring the total to an even figure 4.5 percent is selected.

The total is 20 percent, which means that the total labor on branch circuit conduit and outlet boxes as computed from the regular labor units is to be increased by this percentage, as an adjustment of the labor units to fit the size and general characteristics of this particular job.

It is not absolutely essential that this job factor method be followed in every detail. However, the estimator who uses the same labor units on every job, regardless of the size of the building or other conditions, is making a serious error. The method is offered as a simple and reasonable way of making the adjustment which is necessary in every case. If this method does not appeal to the estimator it is suggested that he compute the job factor, which can be done in a few minutes, and then modify the computed percentage as he may see fit.

Conduit and wire for the service and feeders are now taken off and entered on the feeder schedule sheet. The Conduit and Wire Summary, Form 3-E, may be dispensed with and the summary made on the schedule sheet. It is also convenient to use this sheet for tabulating the cabinets and panels, computing the labor on the special panel and listing the fuses required. Labor units applying to the special panels are found in Table 9, Installment X.

This completes the preliminary work on the wiring for light. In addition to this there are the items of show window equipment, lighting fixtures, telephone work and bell work. No special comments seem necessary on the meth-



Basement Floor Plan, Showing Wiring for Storage Bins

PRICING SHEET

ESTIMATE NO. 100
JOB Store Building for J. W. Smith — SHEET NO. 3
WORK — OF 7 SHEETS
ESTIMATED BY — PRICED BY — EXTENDED BY — CHECKED BY — DATE 7-31-28

MATERIAL	QUANTITY	MATERIAL LIST PRICE	PER	DISC.	EXTENSION	LABOR UNIT PR.	PER	EXTENSION
BRANCH CIRCUIT WORK				(Table)		Hours		Hours
½" Conduit	1830'							
¾" "	1220'							
#54151 4" Oct. Boxes	96							
#4-SSL Boxes	13							
#2539 Covers	13							
#52151 4" Square Boxes	35							
#52-C-I Covers	2							
#52-C-15 "	33							
FS1 Condulets	40							
D833 Covers	39							
D821 "	1							
3/8" Fixture Studs	36							
Labor - Class K 2				7				
½" Conduit	730'					280 C'		2044
¾" "	400'					330 C'		1320
#54151 Boxes	60					72 C		4320
#52151 "	2					72 C		144
FS1 Condulets	40					72 C		2880
Labor - Class D 4				7A				
½" Conduit	1100'					120 C'		1320
¾" "	820'					180 C'		1476
#54151 Boxes	36					86 C		3096
#4-SSL "	13					86 C		1118
#52151 "	33					100 C		33
								21018
				Job Factor - 20%				4204
								#5222

PRICING SHEET

ESTIMATE NO. 100
JOB Store Bldg. for J. W. Smith — SHEET NO. 4
WORK — OF 7 SHEETS
ESTIMATED BY — PRICED BY — EXTENDED BY — CHECKED BY — DATE 7-31-28

MATERIAL	QUANTITY	MATERIAL LIST PRICE	PER	DISC.	EXTENSION	LABOR UNIT PR.	PER	EXTENSION
				(Table)		Hours		Hours
1" Conduit	130'			1		330 C'		429
" Le	4			1		80 ea.		320
" Terminals	6			1		25 "		150
1¼" Conduit	140'			1		430 C'		602
" Le	7			1		130 ea.		910
" Terminals	4			1		40 "		160
2" Conduit	60'			1		610 C'		366
" Le	5			1		2 ea.		10
" Terminals	8			1		60 "		480
Pipe Straps	40			2		480 C		192
Wire - #14 S.D.	9550'			8		7 M		6685
#12	430'			8		750 M		322
# 8	430'			6		3 M		387
# 4 Str. D.B.	430'			6		15 M		645
#3/0	190'			6		36 M		685
#7500 Hubbell Recept.	18			8		85 C		459
#5548 " Plates	17							
#2951 Bryant S.P. Sw.	17			8		85 C		485
#2953 " 3-point Sws.	38			8		40 C		1520
Brass Plates	16							
FX6 Condulet	1							
L866 "	1							
C6 "	1							
#63 Covers	2							
#600 f "	1							
200 a. 3 P. fused XO Sw.	1			16				570
Main Dist. Panel & Cab.	1			9				970
8 circuit panel & cab.D.T.Sw.	1			10				681
10 " " " "	1			10				7
22 " " " "	2			10		14 ea.		28
#130 Fork Sw.30a.2P.220v.	1			16				2
								21649

PRICING SHEET

ESTIMATE NO. 100
JOB Store Building for J. W. Smith — SHEET NO. 5
WORK — OF 7 SHEETS
ESTIMATED BY — PRICED BY — EXTENDED BY — CHECKED BY — DATE 7-31-28

MATERIAL	QUANTITY	MATERIAL LIST PRICE	PER	DISC.	EXTENSION	LABOR UNIT PR.	PER	EXTENSION
SHOW WINDOWS						Hours		Hours
Armored Cable #14/2	120'					60 C'		72
#54151 Boxes 3½" oct.	27					30 C		810
Cable Connectors	54							
#610 X-Ray Reflectors	27					50 C		1350
#5117 Receptacles	27					35 C		945
#10146 Box Covers	27							
#10300 Holders	27							
#11510 Retaining Rings	27							
								3177
FIXTURES								
Chain Pendant Type #2	20					50 C		10
" " Type #3	6					50		3
" " Type #4	4					50		2
Desk Lamps	5					25		125
#61986 Bryant Receptacles	4					35		140
Box Covers	4							
Drop Cords	62					40		2480
#70 Bryant Porc. Sockets	62							
#1173 P.&S. Porc. Covers	62							
#16 Reinforced Cord	120'							4
#11492 Matthews Guards	62							
16" Desk Fans	10					40 ea.		4
56" Ceiling Fans	3					150 "		450
								5095

PRICING SHEET

ESTIMATE NO. 100
JOB Store Building for J.W. Smith — SHEET NO. 6
WORK — OF 7 SHEETS
ESTIMATED BY — PRICED BY — EXTENDED BY — CHECKED BY — DATE 7-31-28

MATERIAL	QUANTITY	MATERIAL LIST PRICE	PER	DISC.	EXTENSION	LABOR UNIT PR.	PER	EXTENSION
BELL WORK						HOURS		HOURS
½" Conduit	180'					280 C'		504
Class D3,D4 & E2								
#54151 Boxes 4" oct. Class W	3					22	C	66
Wall pipe entrances ½"	8					43	C	344
#18 Fixture Wire	530'					6	M	318
Transformer	1							50
6" Bell	1							50
4" "	1							50
#9 Edwards Door Opener	1							2
#35 " Push Buttons	3					50 ea.		150
								1714
TELEPHONE WORK								
½" Conduit Class E2	140'					330 C'		462
#72171 Boxes 4 11/16" square	2					72 C		144
4"x6"x3" Box	1							75
8"x18"x4" "	1							1
FX2 Condulet	1							
LB22	1							
#23 Cover	1							
#200f "	1							
½" Pipe Terminals	4					20 ea		80
#162 Lead Cable 12 - cond.	110'					28 M'		308
#6034 M.W.E. Desk Phone	1							180
#15870A M.W.E.Wall "	2					180		360
#51-S Retardation Coil	1							
#6 Dry Cells	5					25 ea		125
								1434

Pricing Sheets Nos. 3, 4, 5 and 6 with Entries Made to Show Their Use

FEEDER SCHEDULE

ESTIMATE NO. 100
SHEET NO. 2
OF 7 SHEETS
JOB Store Building - J. W. Smith
ESTIMATED BY
DATE 7-11-28

FEEDER NO.	FROM	TO	CONDUIT SIZE	CONDUIT LENGTH	CONDUIT LB.	CONDUIT TERM.	CONDUIT BENDS	WIRE NO. WIRES	WIRE SIZE	WIRE LENGTH	Conduits 1-FE	Conduits 1-LB	Conduits 1-C
1	Service	Dist.Cab.	2"	56'	5	8		3	#3/0	186'			
2	Dist.Cab.	Cab. A	1"			2		3	#8	6'			
3	" "	" B	1¼"	118'	4	2		3	#4	366'			
4	" "	" C	1"	126'	4	2		3	#8	390'			
5	" "	" D	1¼"	14'	3	2		3	#4	54'			
6	Cab.C	Time Sw.	1"			2		4	#8	16'			
	Summary												
	1"	Le Term	1¼" Le	Term	2"	Le	Term	#8	#4	#3/0			
		2	118 4	2	65	5	8	6	366	186			
	126	4 2	14 3	2				390	54				
		2						16					
	126	4 6	132 7	4	56	5	8	412	420	186			
Allow	4		8		4			18	10	4			
	130	4 6	140 7	4	60	5	8	430	430	190			
	Cabs. & Panels							Labor			Fuses 30a	Fuses 100a	
										Plug			
	Main Distribution	3-	200a. terminals					1.11	3.39				
		6-	100a. "					.78	4.68			6	
		6-	30a. "					.27	1.62		6		
									9.69				
A-	10 circuit standard									20			
B-	22 " "									44			
C-	6 " D.T. main Switch									16			
D-	22 " standard									44			
										124			

Sheet No. 2, Feeder Schedule

ods of making up the lists of material required for these items. Preliminary notes and figures should be made on one or more sheets of Form 2 and these sheets should be preserved and filed with the rest of the estimate sheets.

As previously mentioned, the branch circuit work in the basement is exposed on wood; most of the first floor and all of the second floor take the D 4 classification while a small part of the first floor is Class D 3. Each of these three classes of work takes a different set of labor units. However, there is so small an amount of Class D 3 work (front part of first floor) that it would not be worth while to separate this, therefore in figuring labor the branch circuit work is divided in two parts.

The simplest and most convenient way to handle this situation is to first list all the material and use this list only for computing the cost of the material, and then make two lists of the items on which labor is to be figured, one for each class of construction, using these lists for computing the labor cost only. This method has been followed on Sheet No. 3.

As indicated on Sheet 3, labor units for the exposed work, Class E 2, are taken from Table 7, and for the concealed work, Class D 4, from Table 7 A. As a further confirmation of the reliability of the data in Table 7 A, it is interesting to note that on the Class D 4 work there is a difference of only 1½ percent between labor totals calculated by the two methods, using Table 7 in one case and Table 7 A in the other.

It will be noted that 13 floor outlets are shown as the plans and listed on Sheet No. 1. These are not watertight flush floor boxes but are small pressed steel boxes located a few inches above the floor for future connections to counter and show-case lighting fixtures. The labor on these would not be essentially different from that on the ceiling outlets and therefore the same labor units are used. When the total labor on this part of the work has been computed the job factor is applied, that is, 20 percent is added.

All other material for the wiring installation is entered on Sheet No. 4.

Labor on the large conduit is figured from Table 1 with an additional allowance for pipe straps fastened with wood screws. Most of the No. 8 wire is in one run, a few feet being required for connections between adjacent boxes, and the labor figure for a 400 ft. run is therefore used. There are two runs of No. 4, so the average length of run is 215 ft. The No. 000 is all used in one run. The labor on the 8-circuit panelboard which has a double-throw switch in the mains will be the same as for a standard panel and cabinet, plus an allowance for three additional 30 amp. terminals. The time switch is given the same labor allowance as a 3-pole 30-amp. standard switch.

Some of the items on Sheets 5 and 6 have not yet been covered in the tables of labor data published in this series.

The equipment at each show window outlet consists of a retaining ring set in the wood ceiling over the display space (holes to be cut by the carpenter), a reflector, holder, receptacle, box cover and outlet box. Two circuits are brought to an outlet in each window, and each alternate receptacle outlet is connected to one circuit, connections between the outlets being made with armored cable. It is evident that the boxes, receptacles and cable could be assembled and connected on the floor and then placed in

(Continued on page 40)

BRANCH CIRCUIT SCHEDULE

ESTIMATE NO. 100
JOB Store Building — LOCATION — SHEET NO. 1
OWNER J. W. Smith — ADDRESS — OF 7 SHEETS
WORK Lighting Circuits — SCALE 1/4" — ESTIMATED BY — DATE 7-1-28

FLOOR	OUTLETS: CEIL.	BRKT.	FLR.	P.R.	SWITCHES: S.P.	D.W.	4-W.	Wall Fans	Pull Box	PIPE ENTRANCES: CEILING ½"	¾"	1"	WALL ½"	¾"	1"	CONDUIT AND WIRE: #8	#6	#4	#12	Odd Wire
B	60			1	7	32			2							695	394		366	360
1	27		13	6	6	3		8								905	665			118
2	9			1	4	3		2								184	126			68
	96		13	8	17	38		10	2							1784	1185		366	560
															Allow	46	34		64	
																1830	1220		430	

WIRE SUMMARY	No. 14	No. 12
¾" CONDUIT	3660	
½" -	4880	
1" -		
ODD WIRE	560	
OUTLETS	368	
CIRCUITS	372	
	9840	
ALLOWANCE	140	
TOTAL	9980	
#12	430	
#14	9550	

OUTLETS	
CEILING	96
BRACKET	
FLOOR	13
PLUG REC.	8
SWITCH S. P.	17
- D.W.	38
- 4-W.	
Wall Fans	10
Pull Boxes	2
	184

Wall Outlets
P.R. 7 Boxes, 1 F.S. Condulet
S.P. Switch 10 7
3-W. " 6 32
Fan 10
33 40

Area Bsmt. 4600 sq. ft. — Size Factor 12.5
1st Fl. 4600 — Layout 3
2nd Fl. 720 — Genl. Contractor 4.5
Total 9920 — Job Factor 20.0 %

Sheet No. 1, Branch Circuit Schedule

What Should a Contractor Earn?

Many contractors have asked the editor of THE ELECTRAGIST how much they should pay themselves in salary. To answer this question THE ELECTRAGIST undertook a survey to find out what the general practice is amongst electrical contractors. The interest in the subject is apparently very great for over 20 Percent of the subscribers to THE ELECTRAGIST to whom we wrote answered some of the most personal questions it is possible to ask a business man. The article gives the results of the study.—The Editor.

THE average electrical contractor, if such a man could be found, pays himself a salary of $3,205 a year, just a little more than he pays his average superintendent—$2,810 a year. He does an average annual business of $60,533 a year, and the amount drawn out each year in salaries for himself and his partner is 7 percent of the total volume of business. This "average" contractor has been in business just 10 years.

Such are the results of a study just completed by THE ELECTRAGIST amongst its subscribers. It has been contended by many people that contractors do not pay themselves as much as they pay a good wireman. Undoubtedly this is true in some instances, but the results of this survey give evidence of the fact that at least amongst the better managed contracting concerns, the business policies which THE ELECTRAGIST has been emphasizing for years have taken root.

Of the 112 electrical contracting businesses studied in this business survey, 22 percent were partnerships, 15 percent were corporations, and 63 percent were entirely owned by individuals. Two of the companies were in the throes of a reorganization and were not considered in the figures quoted here. About 20 percent of the contractors in the survey work with the tools although they are sole owners of their own business, and this is not confined entirely to small businesses, although in most cases it is the owner of a small business who works with his men.

The average salary earned by owners who work with the tools is $2,000 a year, just 10 percent of the average volume of $20,000. This salary is more than 50 percent less than the average for all contractors, while the volume is about 1/3 that of the average business. Can it be that a contractor who works with the tools is unable to take the time to build a larger business and for that reason must be satisfied with the smaller compensation?

The average contractor pays himself 7 percent of his volume. Many contractors pay themselves considerably more than that. Two partners, established four years ago, earn $5,000 a year from a business amounting to $36,000—about 14 percent. One contractor in a small town pays himself $3,000 a year from his business, which amounts to $20,000 a year—a salary of 15 percent. He has been established for six years.

One new business, started two years ago, is now paying its owner 25 percent of a business volume of $11,000—a salary of $2,800.

Apparently, the larger the business the smaller the percentage paid by the owner to himself in salary. The average for businesses under $20,000 in volume, according to this survey, is 20 percent; for businesses from $20,000 to $50,000, 10.5 percent; from $50,000 to $100,000, 7 percent; from $100,000 to $200,000, 5 percent; over $200,000, 3 percent. (For businesses over $200,000 in volume this percentage may not be accurate because there were only five answers in this group and one was so far below the average it may have unduly influenced the average figure.)

With a few exceptions, which are to be expected, the salary received by the owner or partner usually increases directly in proportion to the increase in volume. Fig. 1 shows the average range and the ideal average. Extraordinary circumstances of various kinds cause the unusual results shown in a few instances.

Under $10,000 volume, no figures are accurate, because a business that small

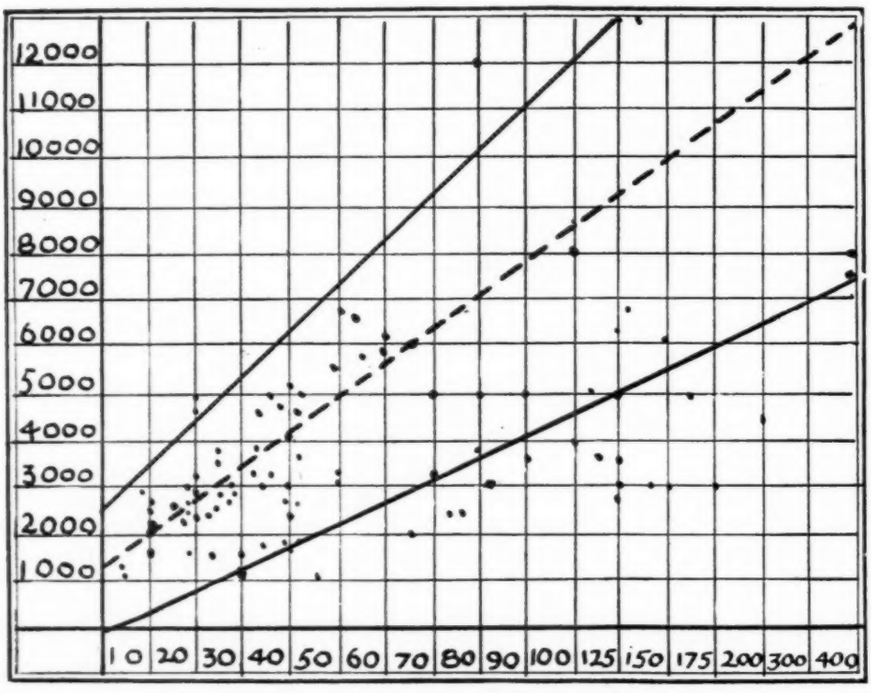


Fig. 1—Salaries in relation to volume of business. Solid lines show the reasonable range; dotted line is ideal average. Figures at the left are yearly salaries of owner or manager in dollars.

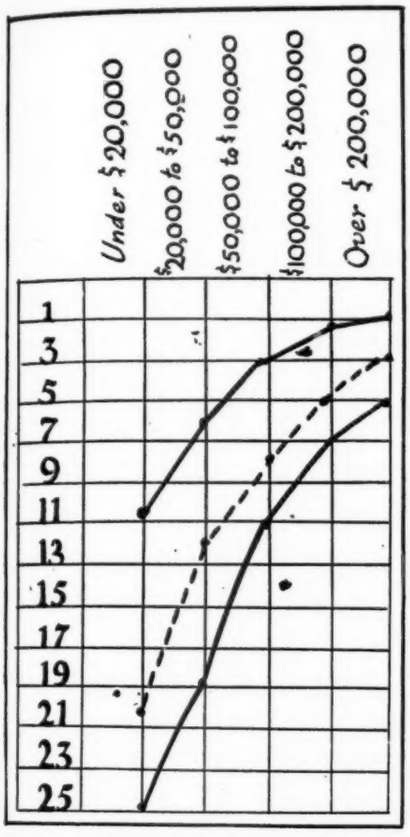


Fig. 2—Salaries in Percentages of Volume

Figures at left are salaries of owner or manager as percentages of the volume of business. Averages are shown by the dotted line.

pays no one a management salary. Income earned by the owner while working with tools is not salary, but direct labor expense to be charged against the job rather as overhead.

If a man spends all his time with the tools and none in management, he is not entitled to any salary; and it would seem from this study that such businesses do not grow, probably because the owner has no time to devote to the business.

The average salary paid to themselves by owners of businesses under $10,000 in volume is $1,812 per year, or 79 cents per hour on a 44 hour week basis. This is scarcely good pay for a journeyman, and it appears that the owner of such a business, unless he can make more than an average of $1.00 an hour, could, generally speaking, more profitably work for someone else.

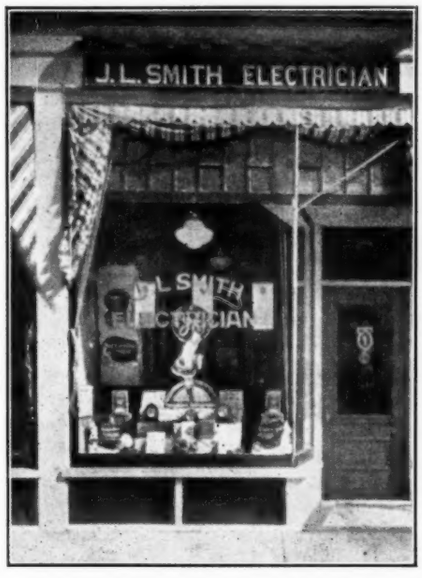
A well conducted business grows, of course, with time. Consequently, salaries increase as the years go by.

One company which started in business on April 10, 1921, paid the owner $150 per month the first and second years; $175 per month the third year; $200 per month for the fourth, fifth and sixth years; and $250 per month for 1928. All salaries will be increased in 1929 if the business continues at the present rate. All money not paid out in salaries goes into a surplus fund in the bank for meeting emergencies and obtaining cash discounts. As the surplus increases the salaries are increased; the surplus at the end of six years amounts to $4,100. This is a fairly small contracting business in a very small midwestern town, located in a section which has felt considerable business depression for several years.

Of the 13 contractors in the survey with a volume of more than $100,000 a year, the average age is 14 years; whereas the average business for the 17 contractors less than 5 years in business is only $33,500.

Unique Contractor Advertising

J. L. SMITH, electrical contractor of Lexington, Mass., has just published a unique advertisement for electric refrigerators which has created a lot of comment. The advertisement takes advantage of the popularity of the phono-



graph record, "Two Black Crows," and consists of a dialogue between them which concludes that electric refrigerators can be seen at Jim Smith's store. Mr. Smith, whose store front and window display are shown, has been in the electrical business in Lexington since 1918. His store is modern in every way, and his advertising, as shown by the following copy, is equally up-to-date.

Two Other Black Crows

Talk Temperature

(Apologies to Moran and Mack)

1st *Black Crow*: Hi! big boy, where at you get them tongs?

2nd *Black Crow*: From a ice company—they let me have em.

1st.: Wh-ut you tryin' to do? Be a Red Grange or somethin'?

2nd.: Oh, no, no. No. No-ooo. Ah just rides around all day, and drops a chunk here, and a chunk there.

1st.: Doggone, you kin have your old job. I gets nuff ice in the winter time just goin' to the front door.

2nd.: Well, you see, ah goes to the back door.

1st.: Which back door?

2nd.: Why, any back door.

1st.: Ah know, but why?

2nd.: Because people want ice, thas why.

1st.: What people?

2nd.: People that ain't got none.

1st.: Oh, yes, ah hadn't thought of that . . . But supposin' they did have some? You wouldn't give 'em ice then, you wouldn't do that.

2nd.: Course I wouldn'. I'd wait until what they had melted, then I'd give 'em some more.

1st.: H-h-how'd you know when it melted? How'd you know that?

2nd.: They'd tell me, thas all.

1st.: Ah hadn't thought of that.

2nd.: Doggone, Amos, sometimes I think you're so dumb that—

1st.: Neva mind. I ain't dumb 'nough to take a ice man's job. I been readin' where ice men are goin' to all be outa work.

2nd.: Boy, you bin readin' the wrong kind of fiction.

1st.: No, Ah ain't. You ever hea'd tell of these here iceless 'frigerators? Oh, they are so col-l-l-d!

2nd.: How could a thing be a 'frigerator without no ice in it?

1st.: But they is ice in it.

2nd.: Well, how is it iceless then? W-what causes that?

1st.: They's pipes in it like a still and you turn on the 'lectricity and pretty soon you have ice. Jes' press the button, thas all. It is so simple.

2nd.: You mean it makes ice?

1st.: Yes, it knows how.

2nd.: How does it know how?

1st.: Ah doan know. It's jes' one of those things.

2nd.: Even so. Ah'l bet it ain't as good as my ice? My ice is so cold they has to put it in steam-heated ice boxes to keep the cook from gittin' pneumonia e'vy time she opens the 'frigerator door.

1st.: Boy, that ain't nuthin'. These 'lectric 'frigerators is so frigid that they has to keep the kitchen windows open in the winter time so's to let some warm air in! Any how, I'd rather not hear any more 'bout it; jes' go into Jim Smith's store an' see for y'self.

Why Inspectors Refuse to O. K. Jobs

When an inspector withholds approval from work done by a contractor, that work has to be repaired or done over again. The waste caused by this non-approval is an economic loss that can and must be reduced. The contractor loses, the customer loses. The Electragist has made an effort to find out why inspectors withhold approval and what can be done to eliminate some of this waste. The answers show what must be done.—The Editor.

CARELESSNESS — that's why inspectors refuse to O. K. jobs. Carelessness on the part of the contractor or his men, leading chief inspectors say, is the most important reason for non-approval of jobs, and the resulting waste can, in large measure, be eliminated by attention to details. Lack of knowledge on the part of wiremen is another frequent cause of disapproved jobs; lack of proper supervision by foremen or contractors and deliberate sloppy wiring by contractors who took the work at loo low a price are the other causes.

There is a remedy for each of these —sound, workable remedies, too.

This analysis of causes of non-approval of jobs and the remedies by which contractors can effect savings was obtained by THE ELECTRAGIST from a survey conducted among chief electrical inspectors all over the country, in cities both large and small. Inspectors were asked: "What are the causes for non-approval of electrical installations? How can the causes be eliminated and the great wastes in money and efficiency be saved?" They responded gladly, and here is an analysis of the opinions of all the leading chief inspectors.

Almost every inspector stated that the chief cause was carelessness. If wiremen would take the time when the job is finished to test and inspect it they would easily find the omissions and complete the job satisfactorily in a few more minutes. Connections not properly soldered and taped, grounding not properly provided for, covers and knockouts omitted from boxes, sockets not tightened—these are carelessnesses that could easily be avoided if the man who wired the job would take the time to check up on his work.

Whereas it might take only a few minutes to make the proper additions to complete the job satisfactorily while the workman is there with his tools and materials handy, it may take several hours to do that later, after the inspector has told the contractor to finish the job.

Careless Practices

Some of the leading careless practices which are frequently caught by inspectors are: Armored cable not properly supported or secured to outlet boxes; covers on boxes missing; open knockouts in outlet or switch boxes; splices in wire not soldered or taped; conduit not grounded; wires fused beyond safe carrying capacity; fixtures insufficiently supported; wires left exposed to mechanical injury.

Nearly every inspector agrees that these careless irregularities can be prevented by requiring the workmen to inspect and test their own work before the inspector is called in; or by the contractor or superintendent carefully inspecting the work himself prior to inspection by the local inspector.

Several remedies for carelessness are proposed by inspectors. The most efficient method, according to a number of inspectors, is to require wiremen to repair careless mistakes "on their own time." In the case of one city in North Carolina, where there were 80 non-approved installations in a few months, not one job was found irregular by the inspector which was done by a contractor who enforced such a rule. When the wiremen have to make good their own careless mistakes, they don't make careless mistakes. Other methods of preventing these irregularities include: Fining the journeyman for carelessness; fining the contractor when a journeyman is careless; requiring extra re-inspection fees which are heavy enough to eat into the profits; withholding licenses of journeymen or contractors who make errors frequently.

The second reason why inspectors have to withhold approval of jobs is lack of knowledge. Many times, according to the chief inspectors in this survey, wiremen do not know their Code; oftentimes the contractor himself fails to keep up with the changes, or neglects to inform his employees of new additions in the Code or local regulations. Several remedies for this situation are proposed: Contractors should have monthly meetings with their men and go over all new regulations and some of the old ones which have been violated through ignorance—that is one suggestion frequently made by inspectors. And one inspector adds point to the suggestion by stating that one contractor who did this never had any trouble with the inspection department because his men didn't make mistakes.

Another remedy, according to one chief inspector, is a subscription to THE ELECTRAGIST. A number of chief inspectors pointed to the articles in this magazine, the Code Chats, the analysis of Code changes, and other Code information as useful methods of combatting the waste resulting from ignorance. One inspector said he wished every contractor would get THE

ELECTRAGIST and read its articles on the Code, passing them on to his men, so there would be fewer irregularities in wiring jobs.

Too Low Bids

But one of the most important causes of non-approval is the rush required of wiremen because contractors have bid too low, or have underestimated the time required to do the job, and are consequently hurrying through with skimpy work and cheap materials in order to prevent a loss. Many inspectors called attention to this situation and attempted to find solutions for it. The chief inspector of one of the largest eastern cities states that "most of the faulty work is done by electricians of mediocre ability who attempt to do work at very low prices. As a rule such electricians are the ones who have been unable to hold down a real job or who have been unable to maintain a high standard of efficiency with legitimate contractors. Having worked for somebody else and not being able to hold down a job they have drifted into business for themselves. They maintain an existence by working long hours and they are able to quote low prices, because the work is not always of an adequate nature."

Another inspector reports that his trouble with electrical contractors who cut prices on their jobs is that they cut all wiring sizes to the minimum and do not allow for future extensions, which eventually leads to an expensive proposition for the property owner. Often the wire sizes are smaller than is safe or than the Code permits, and then the contractor has to reinstall the wiring—at a considerable expense to himself.

Cures for this situation—shoddy wiring produced by cut price contractors—are proposed in great numbers. Licensing of contractors after an examination is advocated by a great many inspectors. In those cities where such a system is already in effect, its good results are mentioned; in other cities the inspectors feel that an examination should be required. One of the chief inspectors in a very large city says that a man entering the contracting business should prove his knowledge of recognized electrical practices, through an examination, should indicate financial ability, and be bound to assume his proper responsibility to the public and his industry.

In a large middle western city all contractors are registered and a record of all flagrant violations on the part of each contractor is kept. This enables the inspection department to make the contractor reform or put him out of business.

One of the most interesting discussions of this situation came from an inspector in a small city in New Jersey who wrote: "When the City Council passed our electrical ordinance, all my troubles were stopped. Previous to its passage I had 124 contractors from all over the world. I believe they came from everywhere. After the passage of the ordinance twelve were given licenses who had a local place of business. The rest we turned down. I gave the twelve licenses to understand that work must be done right or I would prefer charges against them and take away their licenses. To get it back would mean an examination, and we have a set of sixty questions made up by our teacher in the vocational school. One contractor got tough and the Judge said, $25.00 and costs. The next month he was still sore and the Judge said, $50.00 and costs and don't come back again. I have had no more trouble."

Good-hearted Inspector

There's at least one good-hearted inspector in existence, on the west coast. Discussing the subject of carelessness as a cause of withholding of approval this inspector said that he thought inspectors were inclined to be a little too technical in small things, such as a missing knob, a loose piece of tubing at the outlet, or a loose lock nut at the outlet boxes. For these small omissions, he went on, the wireman is brought back on the job and sometimes at a considerable expense to the contractor. "Many times I have corrected these omissions when making inspections and said nothing about them but a little later took it up with the firm and drew their attention to these things and asked their wiremen to be more careful."

Too many contractors, with too little work to be done, and consequently low prices, produce jobs from which approval must be withheld, according to one chief inspector in California. In a city with about 15,000 population, he stated, there were twenty-one licensed electricians, of which only four lived in the city. The rest came from nearby towns. "Our local people are well able to do all the work there is here; the result is that the work is being taken at prices that hardly pay for material and labor. An ideal condition would be one where the owner would keep the electrical work out of the general contract and deal with someone he knows is responsible and get something worthwhile at a fair price."

Education

One chief inspector disagrees with the licensing and fining system of handling contractors. "We have tried prosecution, legislation and now we are trying the experiment of extra fee charges for inspection of corrections, but so far the value of these things has been just fair." This inspector feels that the best way to cure the situation is by education. If the better class of contractors would refuse to sell jobs over the counter, they would soon have all the worthwhile business and get paid for it.

One suggestion for eliminating carelessness on the part of workmen is this: Stabilize the working force so that as far as possible the same employees are kept on a job from start to finish. After they become accustomed to the job they would work faster and with fewer mistakes, especially if they were well supervised.

The terrific competitive situation in most communities can be corrected, according to one inspector, who suggests that a special committee be appointed that would represent the entire electrical industry through the country to make an investigation and report. Then each branch of the industry would act upon this report to try to improve conditions. After a period of one year, according to this inspector, another investigation should be made and results of the first one recorded.

Carelessness can be reduced by reducing the number of wiring types, according to one chief inspector where the metal protected wiring is standard. The number of violations found by inspectors in this city was reduced more than two-thirds following the adoption of the metal protected standard. This reduction, according to the inspector, was brought about largely by specialization on one type of wiring. In this city 80 per cent of all violations are caused by carelessness, whereas poor workmanship, lack of knowledge, and price cutting are responsible for the other 20 per cent.

Overhead

How to Find It How to Apply It

By ARTHUR L. ABBOTT, Technical Director, A. E. I.

THE largest part of a contractor's expenditures are for labor and material used on jobs. Money is also spent for "job expense," i. e. such items as cartage, permit or inspection fee, etc., items which are neither labor nor material but which are clearly a part of the cost of the individual job and can be, and should be, charged directly as a part of the job cost.

The contractor also pays out money for rent, light, heat, telephone, salaries, if he employs a bookkeeper or anyone else in the office, and for a number of other items. These expenses are also a part of the cost of the jobs done, because the only reason an office is rented, telephone service used, and salaries paid is that all these things are necessary in order to do the work on the jobs secured. But it is obviously impossible to include in each estimate as separate items the proper proportion of the rent, telephone bills, salaries, etc., fairly chargeable to each individual job. Therefore, all these expense items are gathered together into one lump sum, a certain part of which must be included in the cost of each job.

The basic principle to be borne in mind is that money is spent for these overhead expense items; that the only source from which the business receives any money is the customers for whom work is done; and that therefore the overhead must either be included in the charges to customers or else paid out of the pockets of the contractor.

The contractor's problem is to first find out what his overhead is, and then to find some practical method of distributing this amount on a fair basis to the various jobs done.

The contractor's overhead expense is a definite amount of money which should be recorded and totaled for each month. In order to make it possible to watch the various items and so guard against extravagance, an itemized record should be kept. In all but very small organizations it is common practice to itemize the overhead expense under headings very similar to the following, taken from the Standard Accounting System of the Association of Electragists, International.

IT is a matter of much importance that the man on whom the responsibility rests for making up the final selling price or bid shall have a clear understanding of what the term "overhead expense" means, how to determine the average overhead of his own organization and how to determine the amount which should be included as overhead in the total estimated cost of each individual job.

1. Management Salaries.
2. Other Salaries.
3. Non-Productive Labor.
4. Rent.
5. Light, Heat, Power.
6. Stationery and Office Supplies.
7. Travelling and Entertainment.
8. Telephone and Telegraph.
9. Postage.
10. Advertising.
11. Taxes.
12. Insurance.
13. Association Expense.
14. Interest.
15. Automobile.
16. Maintenance and Repair.
17. Miscellaneous.
18. Allowance for Losses on Notes and Accounts Receivable.
19. Allowance for Depreciation on Furniture and Fixtures.
20. Allowance for Depreciation on Automobiles.
21. Allowance for Depreciation on Tools.
22. Allowance for Depreciation on Merchandise.

A few of these items require some explanation.

Items 1 and 2—These two items are separated in order to make it easier to compare one contractor's total overhead with that of other firms. In nearly all cases the manager of the business is the owner, or if the business is a partnership or corporation the managers are the sole or principal owners. The manager, if also the sole owner, commonly believes that it makes little difference whether he pays himself a regular salary or not because he gets all the profits anyway. It does make a difference, however, because the manager's salary is a legitimate part of the overhead expense and it is a demonstrated fact that the manager will come closer to getting a fair price for his jobs if he knows what his true overhead is and so knows what a fair price is.

A Fair Price

A fair price includes prime cost (labor, material and direct job expense) plus a reasonable overhead, plus a fair profit. An overhead figure which does not include a fair allowance for the manager's salary is a fictitious figure which creates a false impression in the contractor's mind. A full knowledge of all costs including a true figure for overhead will almost invariably result in securing higher prices than where some important item of cost is merely guessed at or only known approximately.

The amount fixed as fair salary for the manager must be based upon the size of the business, the amount which the manager could earn if otherwise employed and the amount for which some other man of equal ability could be hired. For a one-man organization with a very small business the absolute minimum may be taken as the wages of a journeyman working steadily 300 days per year. When the owner and manager works with the tools part of the time, he should follow this procedure:

Make out regular time cards to cover all time working on jobs.

Charge this time against the jobs worked on at the regular rate for journeymen.

Record the total time so spent during each week or month and compute the value of this time at the journeyman's rate.

Deduct this amount from the total sal-

ary drawn and charge only the balance as salary.

Item 3—Many small contractors think it is necessary to pay some or all of their men for eight hours every day even when the men do not work full time. When this is done the wages paid for time during which the men are not working should be charged to Item 3, Non-Productive Labor.

Item 12. Insurance.—Workmen's compensation and public liability insurance are paid for at a fixed rate per hour for labor, are actually a part of the cost of labor, and should be charged as a part of the direct cost of every job. Item 12 will then include only the cost of other kinds of insurance, chiefly fire. Automobile insurance should be charged to Item 15.

Items 18 to 22 inclusive.—All these allowances must be included in the expense for the year when the books are closed at the end of the year. Instead of taking care of these items in the last month of the year it is much better to include a fair allowance each month.

The very small contractor may simplify his accounting by combining some of the above items so that he will only have six or eight separate accounts.

A contractor-dealer who does any considerable amount of merchandising should divide each of the expense items into two parts and charge the proper amount to each department. Overhead on merchandising business is higher than on contracting and it is poor practice to consider that the average on the whole business applies to each department. More complex businesses having three or four departments should allocate the proper proportion of each item to each department. The method of making such allocations is explained in the A. E. I. Manual of Accounting.

Statement

As a matter of management, a statement of overhead expense should be made up monthly and should be carefully watched to see whether the expense is increasing or decreasing in proportion to the amount of business being handled.

Both in order that the contractor may watch his expense closely and in order that he may at all times have an up-to-date figure to use in estimating, it is well worth while to make up each month a figure sometimes called a "moving annual total." Assuming that the books are closed on December 31, the total overhead is known for the twelve months ending on this date. At the end of January the total overhead for that month is found; this amount is added to the total for the preceding year and the amount for January of the preceding year is deducted, thus providing a new figure representing the total overhead for the twelve months from January 31 of last year to February 1st of this year. This procedure is followed each month. Thus there is available at all times a total for the last twelve months. Being a total for twelve months, any monthly fluctuations are eliminated; any increase or decrease in overhead is made evident by comparing the figures, and the last figure arrived at is never more than 30 days' old.

Complete Records

Without this "moving total" the contractor has to depend throughout the entire year on the total found for the previous year.

Whatever method may be used, the records should provide this data:

Total overhead expense for one year in dollars.

Total sales, or volume of business, for the year.

Total cost of material sold during the year.

Total cost of labor for the year.

Total hours of labor for the year.

When the estimate has been completed down to the point of adding the overhead, the known data pertaining to this particular job are:

Cost of material.

Cost of labor.

Job expense.

Total of above, or prime cost.

Hours of labor.

Several methods have been proposed for determining from the records of the business the proper amount to be added as overhead expense to the prime cost of the job.

Method 1. The overhead for the year may be divided by the gross volume for the year, to find the overhead as a percentage of the gross volume; this percentage is then applied (by division, or by the use of a table) to the prime cost of the job. This method may be rejected as unsuitable, because (1) its use requires a complicated mathematical determination, and (2) this method makes the overhead on any job dependent upon the selling price, which for a given job may be set at any amount within wide limits, according to the contractor's judgment. Quite evidently, the proper allowance for overhead on a given job is a fixed amount and does not change with the selling price. The contractor may choose to give a job away for $5,000 or may decide that it will stand a price of $7,500; in either case the job is the same and the overhead cost will be the same.

Method 2

Method 2. The overhead expense for the year may be divided by the total cost of labor and material for the year, to find the overhead as a percentage of the prime cost. This percentage adjusted to fit the size of the job, may be applied directly to the estimated prime cost in the simplest possible manner. This method is widely used, it is very simple and is not open to either of the objections cited under No. 1 above.

Except for a comparatively small number of firms doing a very large business, the size of the individual jobs, handled by one contractor may vary from $5 or even less to $50,000 or higher.

The overhead percentage obtained from the yearly totals is of course the average for all jobs done during the year. But the percentage or ratio of overhead to prime cost is much higher on a very small job than a large job. It is therefore wrong to apply the average percentage to all jobs regardless of size. The average percentage should be increased for small jobs and decreased for large jobs. A method of making this adjustment is provided by the chart reprinted here from THE ELECTRAGIST for June, 1925.

Method 3. The overhead expense for the year may be divided by the total hours of labor for the year, to find the overhead in dollars per labor hour. The principle of this method is more nearly right than that of Method 2, in that the expense incurred in handling a job is to a much greater extent dependent upon the amount of labor involved than on the amount of material. As in the case of Method 2, the hourly cost of overhead computed from the business records is only an average figure and this average must be modified according to the size of the job. No data is as yet available from which a

satisfactory method of making these adjustments can be worked out.

Method 4. The overhead for the year may be divided by the total cost of labor for the year, to find the overhead expense as a percentage of the labor cost. This is essentially the same as Method 3, but is not quite as good a method because the percentage must be adjusted whenever there is a change in the scale of wages, and a direct comparison cannot be made between the percentages arrived at by two contractors who pay different wage scales.

Conclusion as to methods. Method 2 is quite satisfactory and may be used safely. Method 3 is probably the best in principle but if used the contractor should give careful study to the matter of adjusting the average rate per hour to fit jobs of various sizes.

Whatever method may be employed in applying the overhead charge to the individual job, the average percentage or amount per hour of labor must always be determined by each contractor for his own business. General figures made up from the records of a large number of contractors have a value for the purpose of comparison, but should never be used in estimating as a basis for arriving at the overhead allowance to be included in job costs. A table of average overheads is given here:

TABLE 1—Average Overheads

Total Annual Prime Cost	Average Overhead Expense—Per cent of Prime Cost
$ 20,000	39
30,000	37
40,000	35
50,000	34
75,000	30
100,000	28
150,000	25
200,000	23
250,000	21
300,000	20
400,000	18

If a contractor includes all of his legitimate expenses in his charges to overhead and can show a lower ratio of expense to prime cost than is given in the above table for his volume of business, it is a reasonably safe conclusion that he is operating his business economically. Further than this, this data has little value.

It should be noted that in this table the amount of business done per year is stated in terms of the total annual prime cost, and not in terms of the total sales, or amount billed, per year.

It is frequently argued that it is a waste of time to attempt to determine the overhead on a job with any reasonable degree of accuracy, because more often than not the overhead is totally neglected in making up the bid. This point of view is totally illogical.

Assume that the total prime cost of a job is estimated at $20,000 and that the best available data shows that the overhead expense on this job will be 17 per cent of the prime cost or $3,400. The total cost will then be $23,400. Assume further that the contractor considers it good business to bid at some less figure, say $21,000. The common procedure in such a case is to make entries on the estimating sheet something like this:

Prime Cost	$20,000.00
Overhead and Profit	1,000.00
Bid	$21,000.00

This is merely hiding one's head in the sand like an ostrich and refusing to set the facts down on paper because they are not pleasant to look at.

It is far better in every case to add the right amount for overhead to the prime cost, plainly label the total as "cost," and then consider whether it is really good business to make a donation. If the original decision still holds, the entries should be made thus:

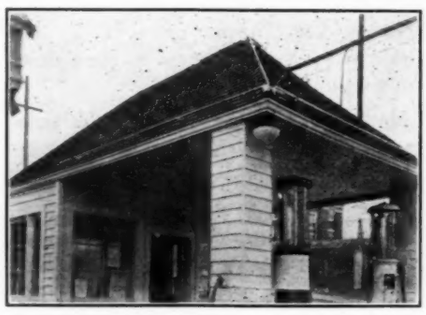
Prime Cost	$20,000.00
Overhead, 17 per cent	3,400.00
Cost	23,400.00
Bid	21,000.00
Net Loss	$ 2,400.00

If the contract is secured on this basis, it is highly important to know that a loss of $2,400 has been assumed, because this amount must now be added to the total overhead expenses for the year. If the average overhead has previously been determined at 28 per cent on a total prime cost of $100,000, the loss brings the figure up to 30.4 per cent and this additional burden must be carried by all the business handled during that year.

By handling the figures in this manner the contractor faces the facts squarely and with his eyes open. Furthermore, a figure set down in black and white which the contractor knows represents the actual cost as closely as it can be determined, has a "psychological" effect which is certainly very healthful.

Uninspected Job Causes Fire

THIS neon outline lighting installation on the roof of a gasoline filling station was put in without inspection, contrary to rules. When a breakdown occurred in the high tension cable insulation, the arc ignited the insulation and the flames were communicated to the wood shingle roof at the point where the cable entered the terminal boxes, which in this case consisted merely of two inch down spouts with ends open. This fire would have resulted in the complete destruction of the building had not the attendant been present and taken immediate and successful action. Reported by L. W. Going, chief electrical inspector, City of Portland, Ore.



An Un-inspected Job

Fire Results

Analysis of 1928 Code--III

This chapter of the Code Analysis deals with control apparatus, transformers, appliances and lamps

Article 10. Rotating Machinery and its Control Apparatus

Section 1001. *General.*

This section includes Rules c and d of the old section, with this heading, and new Rules 1001-a, b and d, as follows:

a. Machines shall be provided with suitable drip pans if required by the authority enforcing this Code.

b. Live parts of rotating equipment of more than 150 volts to ground, except slip rings and brush rigging which do not extend beyond the frames of induction motors, shall not be exposed to accidental contact where accessible to unqualified persons. For the purpose of this rule, ungrounded circuits fed from transformers or overhead supply circuits are considered as being more than 150 volts to ground.

d. Where the wiring to fixed motors is accessible to unqualified persons and is in conduit, armored cable, metal raceways or similar construction, terminal enclosures or housings of substantial metal construction shall be provided at the motor terminals. The conduit, armored cable or metal raceways shall be mechanically and electrically connected to the terminal enclosures or housings. The terminal enclosures or housings shall be of ample size to properly make connections.

Section 1002. *Generators (Other Than in Central Stations).*

Rule 1002-a, location of generators, is the same as old 1002-a.

Old Rule 1002-b on wooden base frames for generators is omitted.

Rule 1002-b is practically the same as old 1002-c, except that a minor fault in the old rule is corrected by stating that single pole protection is approved for 2-wire D. C. generator if the protective device is actuated by the entire current generated *except that in the shunt field*, and omitting the provision that the protective device shall completely open the generator circuit. The new rule adds, as applying to any type of protection:

The protective device shall not open the shunt field.

There are no other changes in this section, except the following new clause in Rule 1002-f:

rubber mats or other suitable floor insulation shall be provided for the operator if the voltage to ground exceeds 150.

Section 1003. *Motors.*

Reference is made to Article 32 for the installation of motors in hazardous and extra-hazardous locations.

Rule 1003-c. A separate disconnecting means, instead of an indicating switch, is required for each motor. The only exceptions formerly made were crane motors (old 1003-g) and any case, excluding auto-transformer starters, where all ungrounded wires were disconnected by the motor starter (old 1003-h). Under the present rule a single disconnecting means may serve a group of motors in the following cases:

(1) Motors which drive the several parts of a single machine or apparatus, such as cranes, hoists, metal and woodworking machines, etc. See Article 30.

(2) Groups of small motors under the protection of one set of automatic overload protective devices, as permitted elsewhere in the Code.

(3) Groups of motors in a single room within sight of the disconnecting means.

(4) Motors which are each controlled by a knife or snap switch alone.

The definitions of "disconnecting switch" and "motor circuit switch" must be referred to in order to fully understand the following new rule:

1003-d.

d. For connected loads of 50 H.P. and less, and also where the controller does not open all ungrounded main leads to a motor, a motor circuit switch shall be used as the disconnecting means, except that a plug connected may be used with portable apparatus. For larger loads, where the controller opens all the ungrounded wires and all auxiliary circuits are fused, a disconnecting switch may be used. For a small motor, where permitted by the authority enforcing this Code, plug fuses may serve as the disconnecting means. For motors controlled solely by a knife or snap switch, the disconnecting means may be at the distribution center.

By main leads to the motor is meant all armature circuits (not including shunt-field circuits) in the case of D. C. motors, and all primary leads (not including the secondary leads of slip-ring motors or the field leads of synchronous motors) in the case of A.C. motors.

The increase in the use of appliances has resulted in stricter rules in the 1928 Code.

Rule 1003-e in the first sentence requires that the disconnecting means shall be of the indicating type, to this extent coinciding with the "indicating switch" of old 1003-g. The next sentence is new:

One pole of the motor controller and one pole of the disconnecting means may be placed in a permanently grounded conductor of circuits supplying current to motor, provided these devices are so designed that the pole in the grounded conductors cannot be opened without opening simultaneously all of the conductors of the circuit.

The disconnecting means must be located within sight of the controller or arranged to be locked in the open position, the former alternative being permission from the inspection department to locate the switch out of sight of the motor.

Rule 1003-f permits a single pole switch to control a one-fourth h. p. or smaller 2-wire motor of not over 300 volts, as in old Rule 1003-g, with the added provision that the switch must be in an ungrounded wire.

Rule 1003-j is new.

j. The control circuits of electrically operated speed-limiting devices and remote-control switches shall be in conduit.

Rule 1003-l requires grounding of the frames of all motors except portable motors, unless they are inaccessible to unqualified persons, this being the same as required by old Rule 1001-a, except that grounding was formerly required only for motors operating at a voltage over 150 volts. Rubber mats or other floor insulation are required when the voltage to ground exceeds 150 volts.

A new rule, 1004-b, requires all motor control apparatus to have a continuous duty rating of not less than 115 per cent of the motor name plate rating.

Section 1005. *Auto-Transformer Starters.*

This section is identical with Section 1004 of the old Code, with two exceptions. Rule 1005-a reads as follows:

a. Auto-transformer starters shall have no exposed parts unless in suitable separate enclosures.

Old Rule 1004-b is omitted.

Article 11. Transformers and Capacitors (Static Condensers) Not Over 600 Volts

No winding of which is connected to a system operating at over 600 volts between wires or from wire to ground.

It will be noted that the inclusion of requirements for static condensers in this article is new and that the application of the article is made more specific by the explanatory addition to the old title.

Section 1101. *Exception.* This is essentially the same as Section 1101 in the previous edition with the necessary wording added to include static condensers, and to exclude radio apparatus.

Section 1102. *General.*

Rule 1102-a relating to the installation of oil filled transformers, includes all the provisions of the old rule, with the following addition:

When installed in, or outside and adjacent to a building they shall be contained in an enclosure of fire-resistive material not communicating with the building except through openings closed by means of approved tight-fitting fire doors.

The old rule, 1102-b, on air-cooled transformers of over 600 volts, is omitted.

1102-b and c are the same as old Rule 1102-c.

A new rule, 1102-d, reads as follows:

d. Oil filled capacitors (static condensers) for not over 600 volts, shall comply with the requirements of section 5008 of article 50 of this Code.

1102-e states that transformer *and capacitor* cases shall be grounded as provided in Article 9.

Article 12. Switches

This article omits the specifications for the details of construction of knife switches contained in the old Rules 1201-a, b, c, d, and e, also 1201-l, m, n, and o. These requirements may all be found in the specifications of Underwriters' Laboratories and are omitted from the Code because they are in general of little interest to contractors and inspectors.

Section 1201. *Open Knife Switches.* The old Rules 1201-f to k, inclusive, are included

in the new edition, renumbered 1201-a to f, inclusive. These are the rules covering spacing and break distance, and special requirements applying to switches with fuse terminals.

Section 1202. *Installation of Switches—General.*

Rule 1202-a, corresponding to the old rule of the same number, is now made to apply to manually operated circuit breakers as well as switches. Location in places where combustible dust may be present is covered by a reference to Article 32. The new rule omits the words "dust-tight" as qualifying oil-immersed switches or circuit-breakers.

Rule 1202-b adds the qualifying clause "Except as provided in Paragraph d of this section" and includes manually operated circuit-breakers in the requirement for location in dry and accessible places and grouping.

Old Rule 1202-c is continued, also including manually operated circuit-breakers.

Rules 1202-d and e are new and are as follows:

d. Enclosures for switches or circuit-breakers on circuits, any wire of which operates at over 150 volts to ground, except where accessible only to qualified operators, shall be grounded as provided in Article 9 of this Code.

e. Switches operating at over 150 volts to ground shall be of the enclosed type externally operable, except where accessible only to qualified persons.

Section 1203. *Position and Connection of Knife Switches.*

There are no changes in this section, except that Rule 1203-b now applies only to "exposed" knife switches and the fine print note under this rule is omitted.

Section 1204. *Number of Poles Required for Switches and Circuit Breakers.*

The inclusion of circuit-breakers in this heading is new.

The last sentence of old Rule 1204-a, and all of Rules b and c, are repeated without change as new Rules b, c and d. The first sentence of old 1204-a is deleted, because the requirements are fully covered elsewhere in the section. The following rule, 1204-a, is new wording and would apparently make it possible to dispense with 1204-c (old 1204-b).

a. Switches, when installed, shall disconnect all ungrounded wires of the circuit which they control.

Section 1205. *Mounting of Snap Switches.*

Old Rule 1205-a is omitted. This rule applied to snap switches used without outlet boxes in knob and tube work, construction which is no longer approved.

Rule 1205-a is old 1205-b revised to require sub-bases under snap switches used in open cleat work and wooden raceway work.

Old Rule 1205-c is omitted, this requirement being covered elsewhere.

Section 1206. *Special Types of Switches.*

Old Rule 1206-a is omitted, 1206-b is retained.

Section 1207. *Marking.*

This is new, as applying to all types of switches.

a. Switches shall be marked with the current and voltage for which they are designated.

Article 13. Switchboards and Panelboards

Section 1301. *Switchboards: Location and Accessibility.*

Rule 1301-b requires that switchboards shall not be built up to "a non-fireproof" ceiling, where the old wording was "the" ceiling.

Rule 1301-e is new:

e. Switchboard frames and structures supporting switching equipment shall be grounded, except that the frames for d-c single-polarity switchboards may be insulated for the full voltage of the circuit in lieu of grounding.

There are no other changes in this section.

Section 1302. *Switchboards: Material and Wiring.*

Rules 1302-a, b, c, d and e are the same as in the old edition.

TABLE 6—Comparison Between New and Old Requirements for Grounding Cases of Instruments, Meters and Relays, Mounted on Switchboards

Accessible or inaccessible to unqualified persons.	A. C. or D. C.	Operating voltage of windings or live parts of instruments, meters or relays.	New	Rule No.	Old Rules 905-k and 1302-g
Accessible	Either	150 volts or more to ground.			*Cases grounded, isolated by elevation or protected.*
Accessible	Either	300 volts or more to ground.	*Cases grounded, isolated by elevation, or protected.*	906-n	
Inaccessible	Either	750 volts or more to ground.			*Cases grounded.*
Accessible	A. C.		Instruments, etc., operated from current or potential transformers, transformer primaries ungrounded and connected to circuits of 300 volts or more to ground, transformer secondaries ungrounded. *Cases grounded.*	906-n	Instruments, etc., operated from current or potential transformers, under any conditions. *Cases grounded.*
Inaccessible	A. C.	Not over 750 volts to ground.	On switchboards with no live parts on front. *Cases grounded.*	1302-g (2)	On switchboards with or without live parts on front. Instruments, etc., operated from current or potential transformers. *Cases grounded.*
			On switchboards having live parts on front. *Cases not grounded.*	1302-g (3)	Instruments, etc., not operated from current or potential transformers. *Cases not grounded.*
Inaccessible	A. C.	Over 150 volts to ground.	On switchboards with live parts on front. *Rubber mats required.*	1302-g	On switchboards with live parts on front. *Rubber mats not required.*
Inaccessible	A. C.	Over 750 volts to ground.	*Cases isolated by elevation or protected.*	1302-g (A)	*Cases grounded.*
Inaccessible	D. C.	Any voltage.	*Cases not grounded.*	1302-g	
Inaccessible	D. C.	Under 750 volts to ground.			*Cases not required to be grounded.*
Inaccessible	D. C.	Over 750 volts to ground.	*Cases isolated by elevation or protected.*	1302-g	*Cases grounded.*
Inaccessible	D. C.	Over 150 volts and less than 750 volts to ground.	*Rubber mats required.*	1302-g	*Rubber mats not required.*

Rule 1302-f contains a number of new provisions. This rule is as follows:

f. Instruments, pilot lights, potential transformers, and other switchboard devices with potential coils (except where the opening of the protective device might introduce a hazard in the operation of devices, or when the switchboard is inaccessible to other than qualified persons) shall be supplied by a circuit that is protected by standard automatic overload protective devices of a rating not larger than 15 amperes except that for ratings of two amperes or less special enclosed types of fuses may be used.

The old rule did not mention "other devices with potential coils" and did not contain the exception in the parenthesis. It did not call for protection by "standard" protective devices.

The requirements for grounding the cases of instruments, meters and relays mounted on switchboards and for grounding the secondaries of current and potential instrument transformers have been made quite complex. A comparison between new rules 906-n and 1302-g, and old Rules 905-k and 1302-g, is made in Tables 6 and 7.

The two following rules, 1302-h and i, are new:

h. The conductors of remote-control switch circuits will be considered as suitably protected by fuse rated at not more than 750% of the same carrying capacity of the conductors as given in section 612 of article 6.

i. Switchboards which have any exposed live parts above 150 volts to ground (or live parts on ungrounded circuits exposed to a higher voltage to ground) shall be located only where under competent supervision and accessible only to qualified persons.

For switchboards having exposed live parts of lower voltages, see sections 405, 805 and 1202.

Section 1303. *Panelboards.*

In Rule 1303-c it is required that cartridge fuses *shall* be placed on the load side of the switches, except in the case of service switches. Old Rule 1303-c permitted any type of fuses to be placed on either side of the switches, except in the case of service switches. The old rule required switch blades to be dead when the switches were open if the switches were placed between busbars and fuses. Under the new rule the blades, *if exposed during operation*, must be dead when the switch is open, regardless of its location otherwise on the panelboard.

Rules 1303-f and g are new:

f. Panelboards so installed as to be exposed to excessive moisture shall be enclosed in approved weatherproof cabinets.

g. For the installation of panelboards in hazardous locations the applicable provisions of article 32 of this Code shall be observed.

The paragraphs of old Rule 1303-e referring to panelboard spacings for link fuses, are now omitted, link fused panelboards being practically obsolete at the present time.

Article 14. Fixtures, Lamp-Holding Devices, Plug Receptacles and Other Outlet Devices

Section 1401. *Construction of Lighting Fixtures.*

The only change in this section is the insertion of the word "steel" in Rule 1401-f so that this rule now reads:

f. Fixture studs which are not parts of outlet boxes, hickeys, tripods, and crowfeet shall be made of steel, malleable iron or other approved material.

Section 1402. *Wiring of Lighting Fixtures.*

A slight change is made in 1402-b, permitting identification of a fixture wire by a band of paint only when the wire-ways in the fixture are of such size that it is impracticable to pull in separate conductors without injury to the insulation.

The following new sentence is added to Rule 1402-d:

All fixtures in dry places designed for or used with Mogul base lamps shall be considered as being exposed to these high temperatures.

The last clause in the old Rule 1402-f is omitted:

TABLE 7—Comparison Between New and Old Requirements for Grounding Secondary Circuits of Current and Potential Instrument Transformers

Accessible or inaccessible	New Rule 1302-g	Old Rules 905-k and 1302-g
Accessible	Grounding of secondary circuits optional.	
Inaccessible	Secondary circuits grounded	
Either		If exposed to voltages higher than 750 volts to ground through transformer windings or otherwise— Secondary circuits either Grounded Isolated Placed in grounded conduit or Identified and guarded

Nor shall electric gas lighting wiring, other than for the frictional system, be attached thereto (to the fixture).

Combination fixtures being now prohibited, the above rule has become unnecessary.

The following new rule, 1402-h, is added to this section:

h. Fixtures, including lamp holders and lamp bases if within reach of grounded surfaces, shall be so designed and installed that no current-carrying-parts will normally be exposed externally.

Section 1403. *Installation of Lighting Fixtures.*

Changes in Rules a and b of this section relative to requirements for grounding fixtures have been discussed under Article 9.

Rule 1403-c, as follows, is new. The last sentence is particularly interesting as marking the final passing into oblivion of gas lighting, except where electric lighting is not available.

c. Gas piping to which fixtures are attached shall be grounded as provided for in Article 9, unless the fixtures are insulated therefrom or are grounded by one of the other means specified in the following paragraph. Gas piping need not be insulated from otherwise well-grounded fixtures. Combination gas and electric fixtures shall not be installed.

Consistent with other new provisions, Rule 1403-d, corresponding to old 1403-b, includes connection to the grounding conductor of non-metallic sheathed cable as a satisfactory method of grounding fixtures.

Old Rule 1403-c on the insulation of combination fixtures, is, of course, omitted. Old Rule 1403-d and the fine print note are omitted, both being unnecessary under the new requirements.

Section 1404. *Construction of Lamp-Holding Devices and Plug Receptacles.*

The necessary changes have been made in Rule 1404-a to cover the new "intermediate" base lamp. The following data applies to sockets of this size:

Nominal diameter, inches	21/32
Watts	75
Volts	125 or 250
Key socket rating—amperes	3/4
Keyless socket rating—amperes	1

Section 1404 corresponds to old Section 1404 down to and including Rule g, and with the above-mentioned exception, there are no changes.

Section 1405. *Installation of Lamp-Holding Devices and Plug Receptacles.*

Rules a to g, inclusive, of this section, correspond to Rules i to o, inclusive, of old Section 1404. In place of the old Rule 1404-h, pertaining to sockets in places where combustible dust may be present, a reference is given to Article 32. Old Rule 1404-o is made stronger by the following new wording: (New Rule 1405-g)

g. Receptacles of the Edison-base type shall be installed only for use as lamp holders. Receptacles installed for the attachment of portable cords shall be of a type not suitable for use with Edison-base screw shells.

Section 1406. *Rosettes.*

This section is the same as old Section 1405.

Article 15. Lamps

Section 1501. *General.*

This is a new section, reading as follows:

a. The provisions of this article shall apply to lamps used on constant potential interior wiring systems and such outside lamps as may be connected thereto.

Section 1502. *Arc Lights.*

Rule a is the same as old 1501-a. Old Rules 1501-b and c are omitted; these required globes and spark arresters on arc lamps and specified the hanging heights inside buildings and over sidewalks. The first sentence of old Rule 1501-d, specifying 50 per cent excess carrying capacity in leads to arc lamps, is also omitted.

The following rule, 1502-b, is new.

b. Arc lamps, except on grounded circuits of which no part exceeds 150 volts to ground shall be effectively isolated or suitably guarded and all exposed metal parts grounded.

Isolation will ordinarily be deemed sufficient when a vertical clearance of 8 feet is provided from floors or other accessible places within buildings, of 10 feet from footways outside buildings, and of 15 feet from roadways. Horizontal clearance from windows, porches and other spaces accessible to the general public should be not less than 3 feet.

Rule 1502-c requires stranded leads to lamps which can be raised or lowered, deleting the old provision "if larger than No. 14."

Old Rule 1501-e required "a cutout" for each lamp or series of lamps. This is now replaced by 1502-d:

d. An automatic overload protective device and a manually operable switch shall be provided for each ungrounded conductor supplying a lamp or series of lamps. A manually operable automatic overload circuit-breaker may be used in place of both the protective device and the switch.

Section 1503. *Mercury-Vapor Lamps.*

The last sentence of old Rule 1502-a is replaced by a reference to Article 32.

Under old Rule 1502-b, one cutout was required for each lamp, series of lamps, or group of five lamps, mounted in one frame and lighted by a single operation; or by special permission, for any group consuming not over 4,000 watts.

Under new Rule 1503-d a group of mercury-vapor lamps wired in parallel, mounted in a single frame and consuming not over 4,000 watts total, may be supplied by a single branch circuit.

Under other conditions the regular rules for branch circuit fuses apply, i. e., not over 15 amp. at 125 volts and not over 10 amp. at 126 to 250 volts.

Rule 1503-e is new:

e. Exposed metal parts of such lamps or fixtures shall be grounded, as provided for equipment in article 9, of this code, if located where persons may easily touch grounded surfaces, at the same time as the exposed metal parts of lamps or fixtures.

Section 1504. *Incandescent Lamps.*

In Rule 1504-a the words "gas-filled" have been omitted from the first sentence of the old Rule 1503-a and this requirement has been added to cover future developments:

Above 1500 watts special approved bases or other devices shall be used.

New Rule 1504-b is the second sentence of old 1503-a.

Section 1505. *Wiring to Lamps.*

This replaces the old Rule 1503-b:

Wires connected to lamps shall have approved insulating coverings with heat-resisting qualities consistent with the temperature to be encountered.

Article 16. Electrical Appliances

The title of this article was changed to its present wording in the 1926 supplement.

Section 1601. *General.*

In the supplement Rule 1601-a was as follows:

This article shall be construed to apply only to electrical appliances intended for use on circuits operating at more than 50 volts.

This rule is now changed by substituting after "appliances:" Designed for domestic or general commercial use.

Under Rule 1601-b this note is added:

It is recommended that the manufacture of portable appliances operating in excess of 150 volts for domestic purposes be discontinued, except for appliances of more than 1650 watts for use on heavy-duty appliance branch circuits.

Section 1602. *Special Provisions for Branch Circuits.*

Under the old code, as modified by the 1926 supplement, two types of branch circuits were recognized for supplying lighting and appliances: (1) Branch circuits in general, or branch lighting circuits, protected by 15 amp. fuses at 125 volts or less and 10 amp. fuses at 126 to 250 volts, as per old Rule 807-f; and (2) special circuits equipped only with plug receptacles and not with lamp sockets and protected by 15 amp. fuses (old Rule 1602-d). This, of course, leaves out of consideration heavy duty lighting circuits supplying mogul sockets only and individual circuits to the larger appliances.

Under the old rules appliances rated at 6 amps. or 660 watts, or less, were permitted on lighting branch circuits. Appliances rated at 1,320 watts each or less could be used on special circuits equipped with plug receptacles only and fused at 15 amps. Each electrically heated appliance rated at over 1320 watts, was required to be supplied by a separate circuit.

The rapid increase in the use of appliances, particularly in residence occupancies, has in very many instances resulted in the overloading of the branch circuits and blowing the branch circuit fuses. This has in turn led to overfusing and frequently to short-circuiting the fuse receptacle, thus leaving both the circuit wires and the appliance itself without any protection. The purpose of the rules and recommendations contained in Section 1602, is to remedy these dangerous conditions by providing branch circuit capacity adequate to handle the appliance load.

Five types of branch circuits are here recognized. The specifications for each type and approved use of each type for supplying appliances are shown in Table 8.

In locations where appliances larger than 6 amperes capacity are likely to be used, as in working spaces, it is recommended that Medium Duty Appliance Branch Circuits shall be installed.

It is recommended that each room be provided with at least two attachment plug receptacles located at different points in order to render unnecessary use of long extension cords and the plugging of portables into lamp holders.

According to this table the only approved use of a heavy duty appliance circuit is to supply one 110 volt 1,650 watt appliance, or two or three 220 volt 1,650 watt appliances.

Rule 1602-b permits the demand factors specified in Article 6 for feeders supplying cooking and baking appliances to be applied also to heavy-duty appliance circuits which supply only cooking and baking appliances rated at over 1650 watts each. The net effect of this rule is to increase the maximum permissible loading of this type of circuit to three 2000 watt cooking and baking appliances, provided these are 220 volt 2-wire appliances.

Section 1603. *Switch or Control Methods.*

Old Rule 1602-e required each electrically heated appliance rated at over 1320 watts to be controlled by a readily accessible, indicating switch, disconnecting all ungrounded wires. This rule is now replaced by Rules 1603-a and b, as follows:

a. Each appliance rated at over 1650 watts

TABLE 8—Lighting and Appliance Branch Circuits

Type of Circuit	Max. Size Fuse	Min. Size Wire	Specification	Appliances Which May Be Supplied	Number of Outlets Per Circuit
Lighting branch circuit.	15 amp. at 125 v. 10 amp. at 250 v.	No. 14	Supplying energy to lighting outlets only.	One or more portable appliances, each rated at 6 amp. or 660 watts or less.	In general, on a 2-wire circuit and on either side of a 3-wire circuit, not over 12. For a circuit supplying not over 1,200 sq. ft. of floor area, no limit to number of outlets, if connected load* is not over 15 amp. for lighting circuits or 10 amp. for combination lighting and appliance circuits.
Combination lighting and appliance branch circuit.	15 amp. at 125 v. 10 amp. at 250 v.	No. 14	Supplying energy to both lighting outlets and appliance outlets.		
Ordinary appliance branch circuits.	15 amp.	No. 14	Equipped with plug receptacle rated at not over 15 amp. 125 volts, or 10 amp. 250 volts. No permanently connected lighting fixtures.	Either permanently wired appliances or plug receptacles or both. One or more fixed or portable appliances, each rated at not over 1,320 watts.	
Medium duty appliance branch circuits.	25 amp.	No. 10	Limited to 125 volts. Otherwise same as ordinary appliance branch circuits.	Either permanently wired appliances or plug receptacles or both. One or more fixed or portable appliances, each rated at *not over* 15 amp. or 1,650 watts, and not over 125 volts.	On a 2-wire circuit and on either side of a 3-wire circuit, not over 12.
Heavy duty appliance branch circuits.	25 amp.	No. 10	Two-wire circuit derived from a 125-250 volt grounded-neutral system. Plug receptacles, if used, rated at 20 amp. 250 volts.	Either fixed or portable appliances or both. One or more fixed or portable appliances each rated at not less than 15 amp. or 1,650 watts and not over 20 amp.	Not over 12.
Individual branch circuit.				Each fixed or portable appliance rated at more than 20 amp.	One outlet only. Sub-division of the load by units within an appliance shall not be taken as a basis for determining the character of the circuit supplying a multi-unit appliance.

*It is understood that by connected load is meant fixed load, exclusive of loads which may be connected to appliance outlets.

shall be controlled by an indicating switch, not a part of the appliance, and which shall disconnect from the appliance all ungrounded conductors of its supply circuit, or a single approved attachment plug and connector receptacle of appropriate rating may be used in lieu of a switch. The location of such control means shall be as follows:

(1) It shall be readily accessible to the operator of the appliance.

(2) In other than dwelling occupancies it shall control only the appliance.

(3) In multi-family (more than two) dwellings a switch shall be within the apartment or on the same floor as the apartment in which the appliance is installed and may control lights and other appliances.

(4) In two-family dwellings a switch may be outside of the apartment in which the appliance is installed but must be readily accessible. This will permit an individual service switch for the building and apartment to be used provided it is accessible to the user of the appliance.

(5) In single family dwellings the service switch may be used for this purpose.

b. Where the switch controls a motor-operated appliance, it shall be within sight of the appliance.

There was much controversy over the interpretation of the old rule in specific cases. The subject has been carefully studied by a technical sub-committee and it is believed that all possible cases are clearly covered by the above new rules.

New Rules 1603-c and d with reference to switches controlling the individual units of appliances and plug connectors for portable appliances, are substantially the same as old Rules 1602-f and i.

Section 1604. *Wires Supplying Electrically Heated Appliances.*

This section constitutes a new sub-division but the requirements found here are practically the same as those of the old code as modified by the supplement.

Section 1605. *Special Provisions for Electrically Heated Appliances.*

Rule 1605-a is old Rule 1603-a.

Rule 1605-b requires a stand for each smoothing iron, etc., the same as old 1602-b, but reads "must be equipped *and used* with an approved stand," and adds the wording: which may be a separate device or may be a part of the appliance.

The note under old Rule 1602-b, recommending a pilot lamp or protective device for each electrically heated device, is replaced by the following rule, 1605-e:

e. In other than residence occupancies each such electrically heated appliance or group of such electrically heated appliances shall be used with an approved signal, unless the appliance is provided with approved integral temperature-limiting device.

Section 1606. *Grounding.*

Grounding is covered by a reference to Article 9.

Article 17. Resistors, Reactors and Capacitors

Section 1701. *Construction.*

This is the same as Section 1701 in the 1925 edition, except that old Rule 1701-a is omitted.

Section 1702. *Installation.*

1702-a is the same as Rule a in the old book. 1702-b to some extent replaces old Rules 1701-a and 1702-b. This rule is as follows:

b. Resistors, reactors and capacitors shall not be placed where exposed to mechanical injury nor in the immediate vicinity of easily ignitable material. When these conditions cannot be complied with, the devices, unless of the oil-immersed type, shall be enclosed in approved metal boxes or cabinets.

Section 1703. *Lamp Resistances.*

This section is unchanged.

Article 18. Storage Batteries

The only changes in this article are the omission of the words "or primary" from the title, the reason for which is obvious, and the revision of Rule 1802-b, to read:

Wiring shall be enclosed in a non-corrodible or suitably protected conduit system or shall be exposed, etc.

There is, of course, no reason why non-corrodible conduit should not be used, or other conduit if it can be protected from corrosion.

Article 19. Lightning Arresters

No changes have been made in this article.

Article 30. Cranes and Hoists

Section 3001. *General.* No changes.

Section 3002. *Wires.* No changes.

Section 3003. *Installation of Wires.*

Rule 3003-a is retained without change. 3003-b as follows, is new:

b. Wiring not in conduit, other than collector wires, and whether on crane or hoist, shall be isolated beyond normal reach of operators or other persons and out of normal reach of tools and materials being handled.

Section 3004. *Collector Wires.*

Old Rule 3004-b provided that main collector wires carried along runways should be "rigidly and securely attached to" insulating supports. The new rule merely requires that these wires "shall be supported on" insulating supports, other provisions of the rule being as before. This change provides for the use of an under-running trolley or collector which lifts the wires off their supports.

The remainder of this section is not changed.

Section 3005. *Collectors.*

A reference is given here to Article 32.

Section 3006. *Switches and Cutouts.*

Where the old rule required the cutout and switch to be readily accessible from the floor, it is now required that:

The switch shall be located within sight of the collector wires and shall be readily operable from the floor or ground.

Rule 3006-b omits reference to the cutout and is otherwise changed to read as follows:

b. Where cranes are operated from cabs a circuit breaker or switch, capable of interrupting the circuit under heavy loads, and readily controlled by the operator, shall be provided in the leads from the main collector wires unless the current collectors can be safely removed, under heavy loads, from the trolley or third rail.

Rule c is unchanged.

Section 3007. *Controllers* No change.

Section 3008. *Grounding.* No change.

Article 31. Elevators

This article includes all the rules contained in old Article 31, with a few changes, and a large amount of new material. The complete text of the article is as follows:

3101. *General.*

a. The requirement of this article shall be deemed to be additional to, or amendatory of, those prescribed in articles 1 to 19, inclusive, of this Code.

b. The maximum voltage permitted on the push buttons of elevator signalling circuits shall be 300 volts to ground.

c. The maximum voltage permitted in the operating devices of electric elevators shall be 300 volts to ground for automatic control elevators having operating devices in the car and at the landings.

d. No part of any electric circuit having a voltage in excess of 750 volts shall be used on any car control system. Circuits of higher voltage may, however, be used in machine rooms or pent houses for the operation of motors and brakes, provided that all control and signal wiring is thoroughly insulated from such power circuits and all machine frames and metal, hand-operated ropes are permanently grounded.

3102. *Wires and Cables.*

a. The flexible or traveling cables of the operating control and lighting circuits shall be of approved Type E or Type S cord, as specified in section 609, article 6 of this Code. Where attached to the car they shall run in approved rigid or flexible conduit, carefully fastened in place and properly bushed.

b. Conductors for lighting and control cables shall not be smaller than No. 16.

c. No conductor smaller than No. 14 shall be used for any elevator operating, control, power or car lighting circuit except as provided above for lighting and control cables and as otherwise provided in this Code for fixture work.

d. No conductor smaller than No. 16 shall be used for any elevator signal circuit except those receiving energy from primary batteries or approved bell-ringing transformers. When No. 16 conductor is used it shall be protected by not larger than 6-ampere fuses.

e. Conductors, other than lighting and control cables, where located in hoistways shall be encased in approved rigid conduit provided that flexible conduit or armored cable may be used between riser and limit switch, interlocks, push buttons or similar devices. Split tees and elbows may be used on exposed conduit work except where the pipe contains feeders. For control circuits the number of wires installed in a conduit may be in accordance with Table 3, Section 503.

f. No electric conduits or cables, except those used to furnish or control power, light, heat or signals for the elevator or hoistways, shall have an opening, terminal, outlet or junction within the hoistway, but shall be continuous between outlets or terminals situated entirely outside the hoistway. Pipes, conduits and armored cables shall be securely fastened to the hoistway construction.

It is not intended to prohibit the interruption of long runs for the purpose of supporting or pulling in conductors, and pull boxes may be installed for this purpose.

g. Elevator circuits, except signal wires receiving energy from primary batteries or approved bell-ringing transformers, shall be installed in approved conduit equipped with approved terminal bushings having an individual outlet hole for each wire; provided that, for more than 8 wires the conduit may be terminated with an insulating bushing and the wires bunched, taped and painted with an insulating paint. The conduit shall terminate as close to the wire terminals as convenience in handling will permit, but in no case closer than six inches to the floor.

h. Wires for elevator circuits including operating, control and power wires, and signal wires when an integral part of the wiring system, may be run in the same traveling cable, conduit, pull box or junction box when the supply is from the same source of power although the voltage is altered within the system, provided that all wires are insulated for the maximum voltage found in the conduit system and the equipment is insulated from ground for this maximum voltage.

i. Where the current characteristics within the system are changed, the wires shall not be run in the same traveling cable, conduit, junction box or pull box, except on the car, at the control boards, floor selectors, hatchway junction boxes and at similar points where it is impracticable to separate such wires.

j. Wires of car-lighting circuits, and signal systems, when not an integral part of the elevator wiring system, shall be separated and run in separate traveling cables and conduits.

k. The wires of motor circuits between motors and control panel may be grouped together without any extra insulation of the separate wires, provided the complete group is either taped or corded and painted in a manner to make same a rigid, self-supporting ferm, not over three feet long, and not in a position liable to mechanical damage or subject to a temperature in excess of 120° F. (49° C.).

l. All wires between main circuit resistance and the back of control panels shall each have a flameproof outer covering, as prescribed in section 1701, paragraph h, of this Code. All other wiring on control panels may be of the rubber-covered type, provided the wires are held in such a manner as to be immovable and free from mechanical injury, and are not subjected to a temperature exceeding 120° F. (49° C.).

m. Wires having a flameproof outer covering or groups of wires covered with flameproof tape shall not be used as connections for the operating circuits of elevator controllers.

Flameproof coverings when damp may carry enough current to cause controllers to function incorrectly and this incorrect functioning may be a life hazard.

3103. *Switches.*

a. A manually operated switch disconnecting all ungrounded wires of the motor circuit shall be located within sight of the motor, unless permission to locate it elsewhere is given by the inspection department. Where the elevator is controlled by controlling the field of a generator, this rule shall be interpreted to mean the switch in the power supply to the motor driving the generator.

b. In garages, hatch limit switches and other spark-emitting devices shall be placed at least four feet above the lines of the lower floor level.

c. Each electric elevator operated by a polyphase alternating-current motor shall be provided with a device which will prevent starting the motor if:

(1) The phase rotation is in the wrong direction, or.

(2) There is a failure in any phase.

3104. *Grounding.*

a. For electric elevators, the frames of all motors, elevator machines, controllers, and the metal enclosures for all electrical devices in or on the car or in the hoistway, shall be grounded.

b. For elevators other than electric, where any electrical conductors are attached to the car, the metal frame of the car, if normally accessible to persons, shall be grounded.

c. Conduit or armored cable attached to elevator cars shall be bonded to grounded metal parts of the car with which they came in contact.

d. Motors, motor-generator sets, elevator machines and controllers mounted on metal beams, which form part of the structural metal frame

of a building, shall be deemed to be grounded. Metal car frames supported by metal hoisting cables attached to or running over sheaves or drums of elevator machines shall be deemed to be grounded when machine is grounded in accordance with this Code.

e. The hand-operated rope (shifting cable) need not be grounded if provided with approved strain insulators.

3105. *Live Parts.*

a. All live parts of electrical apparatus in or on elevator cars or in elevator hoistways shall be suitably enclosed to protect against accidental contact.

b. Unless located in an engine room or other location accessible only to qualified persons the elevator machine and controller shall be installed in a room set aside for that purpose or isolated by elevation or by means of an enclosure or wire grill or the like to prevent accidental contact by persons or objects. This room may also contain other machinery used for the control and signaling of the elevators.

c. If the wiring is on the back of the controller panel there shall be a clear space of at least 24 inches back of the apparatus on the rear of the controller panel and at least 18 inches on the sides of a bank of controller panels, and on at least one side of a single panel. There shall also be at least three feet of clear space in front of the controller.

This rule shall not be interpreted to forbid the enclosing of the rear of control panels in steel cabinets, but when such cabinets are used there must be a clear space of at least 24 inches back of the apparatus on the rear of the controller panel when the back of the steel cabinet is removed.

In Section 3101, a, b and c are new.

Section 3102. The first sentence of Rule a is the same as before. The old rule permitted the travelling cables, where attached to the car, to be either run in conduit or run exposed and attached directly to the car.

Rule 3102-b now permits No. 16 conductors for lighting in the control cables, while the old requirement was No. 14.

Rules 3102-c and d are new.

Rule 3102-e. Armored cable was formerly permitted in a hoistway for any other than lighting and control cables, the new rule requiring rigid conduit with certain exceptions. The last sentence of this rule is new.

3102-f, g, h, i and j are all new.

3102-k is the same as old 3102-e.

3102-m is the same as old 3102-f, with the omission of the provision in the last sentence that the wires be laid flat against the panel. The note under the old rule with reference to bunching wires on the rear of the panel is omitted.

In Rule a of Section 3103, switches, the words "manually operated" have been inserted in the old rule of the same designation. 3103-b is unchanged. 3103-c is practically the same as old Rule 1003-j, corresponding to the new 1003-k.

Rules a and b in Section 3104, grounding, are new.

The old rule, 3104-a, stated that conduit or armored cable attached to elevator cars need not be grounded. New Rule 3104-c requires the conduit or cable to be bonded to grounded metal parts of the car with which they come in contact.

In the first sentence of 3104-d, elevator machines and controllers have been included, the old rule applying only to motors and motor-generator sets. The last sentence is new.

Section 3105, live parts, is entirely new.

Article 32. Hazardous Locations

The old Article 32, extra-hazardous locations, was so short and contained so little that it seems unnecessary to attempt any comparison in detail between this and the new article. In general, the new rules are more rigid and cover details much more fully.

All locations falling under this general classification are divided into three classes, designated as Class I, Class II and Class III. Each class is clearly defined. A decided improvement has been made by stating in the section dealing with each class of location all special requirements for the installation of wiring, equipment and apparatus. Most of these special requirements were scattered throughout the various articles in the old edition. Bringing these together in one article makes them easier to find and results in rules which are better co-ordinated and more specific.

Three Classes Defined

The three classifications are defined as follows:

Class I locations are those in which flammable volatile liquids, highly flammable gases, mixtures or other highly flammable substances are manufactured, used, handled, or stored in other than their original containers.

Class II locations are those in which (1) combustible dust is thrown, or is likely to be thrown, into suspension in the air in sufficient quantities to produce explosive mixtures or (2) those where it is impracticable to prevent dust from collecting in such quantities on or in motors, lamps, or other electrical devices that they are likely to become overheated because normal radiation is prevented.

Class III locations are those in which easily ignitable fibres or materials producing combustible flyings are handled, manufactured, stored or used, and which are hazardous through such fibres or flyings collecting on or being ignited by arcing contacts, resistors, lamps or similar apparatus.

In all these locations the only type of wiring approved is rigid conduit.

Under each class special requirements are given for the installation of service equipment, panelboards, switchboards, fuses, circuit-breakers, switches, motors and controllers, heating appliances, lighting fixtures, portable cords, plug receptacles, and grounding.

Article 33. Garages

No changes have been made in the following sections:

3301. *General.*
3302. *Wiring.*
3303. *Portables.*
3304. *Charging Cables.*
3305. *Switchboards and Charging Panels.*

Section 3306. *Generators, Motors and Control Apparatus.*

3306-*a.*

a. Generators, motors and *control apparatus, that embody the use of commutators, collector rings or other make-and-break or sliding contacts* shall either be totally enclosed type or be located at least *four* feet above floor.

The italics in the above rule indicate new wording. The rule omits the old wording: (Generators or motors) "which do not actually form part of the vehicle equipment," also, the old rule required "unenclosed sparking or arcing parts" to be located two feet above the floor.

3306-b.

b. Generators, motors, *control apparatus and the like, having commutators, collector rings, or other make-and-break or sliding contacts* located more than four feet above floor shall, unless of the totally enclosed type, have wire screens of not less than No. 14 mesh placed at commutator *or brush* ends *to prevent the falling of particles.*

The italics here are new wording. The requirement of screens applied in the old rule to generators or motors located more than two feet but not more than four feet above the floor.

Section 3307. *Special Precautions.*

The following rule, 3307-a, was in the 1925 edition, but was stricken out by the 1926 supplement:

a. Cutouts, switches and receptacles shall be placed at least 4 feet above the floor.

Old Rule 3307-a required switches and cutouts to be enclosed in boxes unless on switchboards or charging panels. This is replaced by 3307-b, as follows:

b. Live parts of all devices shall be guarded to prevent accidental contact by foreign bodies.

The old rule in regard to hatch limit switches is omitted.

The two sections following are new:

3308. *Grounding.*

a. In garages where conduit, armored-cable or metal-raceway construction is employed, such conduit, metal sheaths, raceways and exposed metal frames and enclosures of equipments (including portables) shall be grounded as prescribed in article 9 of this Code. This shall apply to all devices, except pendent and portable lamps operating on grounded circuits of not more than 150 volts to ground.

3309. *Flexible Cords.*

a. Flexible cords used to supply pendent or portable lamps or portables which include lamp-holding devices on polarized wiring systems, shall have one conductor identified, and such identified conductor shall be connected to the screw shell of the lamp-holding device. Receptacles, attachment plugs, connectors, and similar devices used with such cord shall be of the polarity type.

Article 34. Motion Picture Studios

Section 3401. *General.*

The only change in this section is the addition of the following clause to Rule a: but shall not be applied where only approved slow-burning (cellulose acetate or equivalent) film is used.

Section 3402. *Wiring.*

Rules a to f, inclusive, in this section, are unchanged.

In the following rule, 3402-g, the first two sentences are new; the provision with respect to rheostats is the same as before; and the last sentence is a change from the old rule which merely stated "motors shall be of the enclosed type."

g. All live parts shall be enclosed to prevent accidental contact by persons and objects. All switches shall be of the externally operable type. Rheostats shall be placed in cabinets which enclose all live parts, having only the operating handles exposed.

Further specifications for motors and generators are practically the same as apply to Class III, Hazardous Locations.

Rule 3402-h, following, is new:

h. All conduit, armored cable or metal raceways, exposed metal frames and enclosures or equipment shall be grounded as prescribed in article 9 of this Code. This shall apply to all devices, except pendent and portable lamps operating at not more than 150 volts to ground.

Estimating Methods

(Continued from page 27)

position in the space over the window.

Labor data on armored cable calls for a general "handling charge" of .6 hour per 100 ft. and 30 hrs. per 100 for the outlet boxes in such a case as this. The outlet box time includes two cable entrances per box, requiring cutting and stripping the cable and attaching to the box with cable connectors. One-half hour each is allowed for the reflectors to cover unpacking and handling. Time for installing the receptacles is taken from Table 8.

The chain pendant fixtures will be received assembled and wired and merely have to be unpacked, distributed and hung. Desk lamps will require no labor except unpacking and the desk fans will be set on brackets furnished by others and plugged into the convenience outlets. Considering the quantity of drop cords the allowance of 40 hrs. per 100 should be sufficient. 1½ hrs. each is allowed for the labor on ceiling fans.

(The discussion of this installation will be continued next month.)

Effects of the Five-Day Week

The Five-day Week for Electrical Workers is Now in Force in Five Cities. This Article Shows the Trend of Opinion Among Contractors in Those Cities

ONE of the programs to which organized labor is committed, particularly that portion engaged in the building industries, is the five-day week. Is it an economically sound program? Will it slow down production, increase costs, bring new difficulties for the contractor?

As the program is put forward in different cities the contractors should be in a position to know something about the results to be expected and for that reason THE ELECTRAGIST has undertaken a survey of the results experienced in the cities now operating under the five-day plan.

To date the shorter week has been put into effect for electrical workers in Miami, Fla.; Portland, Ore.; Schenectady, N. Y.; St. Louis, Mo.; and Seattle, Wash. Contractors in each of those cities were requested to answer certain questions pertaining to the effects of the plan and replies have been received from every city but Miami.

In general it may be said that the plan is working out satisfactorily. A number of the contractors who replied appear to be very much in favor of the plan and only a few gave any indication of being opposed to it. There is, however, this to be said: The full success of the plan, so far as the electrical contractor is concerned, is predicated, first of all, upon similar working hours being enforced by the other building trades, especially the concreters, masons and carpenters.

Complications

If these other trades continue on the five and a half day week the complications that rise on Saturday work are apt to be very unpleasant. While in general it would appear that the business agent was inclined to be reasonable with the electrical contractor on Saturday work, the men are not so easy to convince. In fact, as one contractor expressed it, it was very difficult to find men who would work on Saturday mornings at straight time.

Where the electrical trade went to the five-day week before the other trades, or a majority of them, there were always complications arising over Saturday work. When the other trades have gone to the shorter week as well, these complications, apparently, have vanished.

The question asked in the survey and the answers summarized are as follows:

"Has the five-day week increased or decreased the cost of wiring? How much?"

With two or three exceptions the replies stated that there has been no change; one man was of the opinion that the cost might be lower and the others of the opposite opinion. One contractor stated the increase was around 13 percent.

Opinions Only

Of course, it must be remembered that these answers as well as the answers to most of the questions, are largely matters of individual opinions. It is only when the majority of these opinions agree that we are able to form our own opinion. And even when opinions agree as closely as they do in this connection, no absolute reliance can be placed thereon because they are opinions and are not, apparently, backed up by any definite cost analysis. In fact it would be virtually impossible to secure an exact financial comparison between the five and the five and a half day week because there are so many varieties to be taken into consideration.

This much is true, however, the efficiency on productivity of the average wireman on Saturday mornings, and especially during the month of enjoyable outdoor weather, is way below that of the other five days. Undoubtedly there has been some saving in the elimination of this inefficiency. On the other hand, if more men are required during the five-day week then there is added expense of supervisors. Furthermore, the office overhead and the cost of automobile and driver are not lessened in the short week but their cost per productive hour is increased.

The confusion attendant upon the paying of the men on Saturdays is eliminated by the short week because there is more time to make up the payroll on Thursday or Friday then on Saturday morning.

Some of the contractors who replied stated that by not having to watch jobs on Saturday mornings the office had time each week to clean up a lot of odds and ends, make out cost records and get ready for the next week. Previously the contractor himself, with perhaps an assistant, had attempted to do most of this work alone on Saturday afternoons.

"Has the five-day week speeded up or slowed down production? To what extent?"

Again the preponderant concurrance of opinion was that there was no change.

"Has the contractor had to increase or decrease the number of mechanics on his payroll to do the same amount of work? How much?"

The answers to this question were more evenly divided; about 60 percent noticing no increase and about 40 per cent an increase, the increase ranging from 50 percent to 25 percent.

Almost a quarter of those who replied to the questionnaire would not commit themselves on this question for the reason, as they put it, that they had no way to make a comparison.

Efficiency

"Are the men more or less efficient under the short week?"

The answers here were interesting with the exception of eliminating the inefficient Saturday time. The St. Louis contractors reported no change in efficiency as did the Schenectady contractors. The Seattle contractors were divided, while only two of the seven Portland contractors noticed no change, the remaining five reporting improved efficiency.

"Has the five-day week caused any new complications in conduct of the electrical contractor's work with other trades?"

Where the other trades are originally all on the short week there are appar-

ently no complications but where they are not there are complications.

"What other trades, alongside of which you have to work, have also adopted the five-day plan?"

St. Louis—Virtually all.

Portland—Virtually all.

Seattle—All in summer months; a few for the rest of year.

Schenectady—Painters.

"If necessary to work on Saturday on account of concreting or other emergency is the Saturday time over time?"

In Portland, Seattle and Schenectady the men may work up to noon Saturday at straight time on concreting and emergency work, after that overtime.

Saturday Work

In St. Louis if the contractor finds he must have men Saturday morning because of concreting or emergency work he may secure permission to use them at straight time provided he reports the work to the business agent on Friday and is able to convince him of the necessity. The decision of the business agent is final and there is no other recourse. There is little such work in St. Louis in that the other trades are on the short week. It is apparently difficult to convince the business agent of the necessity of such work because most St. Louis contractors answered this question by saying that overtime has to be paid.

"Was the adoption of the five-day week mutually agreed upon between the contractors and the union?"

In Portland and Seattle the replies were unanimous that it was a mutual agreement.

The replies from St. Louis and Schenectady were about equally divided, half, saying "mutual" and half saying they were accepted by the contractors on the demand of the union.

Some of the replies had some interesting comments which are added:

"Personally, I believe the five day week beneficial to the physical conditions of all. As to the financial side, it is detrimental only as to construction, on account of the inaction on Saturday and Sunday, but to my mind, the general benefit far exceeds the financial loss.

"It is our opinion that the Saturday half-day was not a very profitable period. The realization of the men that they only had a few hours to work seemed to put them in the frame of mind that they felt they did not have to work very much and more time was spent in getting under way in the morning and preparing to close at noon than was necessary."

"It is our belief that, sooner or later, the five day week will be adopted in all the big cities, in order to better distribute the work among the men, and I feel sure that it would not work a hardship on the contractor."

"I believe the five day week to be an improvement over the five and a half day week. I do not believe it has affected the cost of wiring nor has it slowed down production within my experience. I have always felt that there has been in the past an excessive amount of wasted time on Saturday in proportion to the hours of work. The men arrive on the job somewhat in the spirit that it is a holiday and whatever work is done that day is affected by that attitude."

"If it were left to me, I would say it would be a grand thing to close down Friday providing the carpenters and masons shut down. As long as other trades are working Saturday morning, I think electricians should."

"If it has increased or decreased the cost of wiring is hard to say, but we do know that it has given a chance to some of the union men, unknown to the union, to take work for themselves, not reporting it to the contractor."

"Due to excessive detail in connection with our branch of the industry, we find the five day week allows us a sort of clean up day and has proven more satisfactory than a six day week. We have been working for years on the five and a half day plan and now we are in a position to take Saturday afternoon off and we find it an improvement. We are, however, allowed a service man on Saturday all day at straight time for service calls."

"We like the plan very much. It gives the office a chance to keep up its end."

Clean-Up Day

"We are favorable to the five day week as the week winds up Thursday night, we pay on Friday, that gives us Saturday to get our costs on jobs up to date and do our weekly billing for jobs. Also, it lets us have the opportunity to clean up any odds and ends such as grief on bills or other clerical work such as making out permits and checking over jobs."

"Taken as a whole, the five day week has proved satisfactory. We get just as much work out of our mechanics and it gives us a day to catch up and get started for the next week."

"The five day week, in my opinion, is economically wrong and will end either in high wages or cease, due to the workmen having more leisure time, thus spending more of the income they claim is insufficient."

"The contractors feel the five day week is very good and believe it will remain in existence in St. Louis, as we believe there is a lot of lost time on Saturday morning."

Electric Club Outlines Its Activities

Cooperative effort to increase the sale of electrical equipment and the use of electricity can be applied in many directions, according to a statement of activities issued by the Kansas City Electric Club. The club, which has been organized since October, 1923, set down an outline of the activities it is engaged in and the purposes which it is trying to accomplish. The following programs are now in operation:

1. Fostering the strongest possible co-operation between all branches of the electrical and radio industries through luncheon meetings and other get-together activities.
2. Perpetuating itself as a strictly business organization, carried on to produce tangible results for its members.
3. Serving other business interests and the public as an impartial bureau of electrical and radio information.
4. Assisting, in so far as possible, the efforts of the Kansas City Chamber of Commerce to secure more industries for Kansas City.
5. Encouraging better merchandising, sounder business practices and the spirit of fair play at all times to each other and the public.
6. Co-ordinating and encouraging electrical exhibits at worth-while expositions.
7. Establishing electrical homes, home-lighting exhibits and educational expositions.
8. Safeguarding the electrical and radio industries against adverse legislation, unfair or misleading statements or false impressions.
9. Securing the right kind of publicity and advertising.
10. Establishing a consciousness in the mind of every electrical man in Kansas City that he cannot be a 100 percent advocate until he himself and his intimate friends own and use many electrical appliances, all properly connected to convenience outlets.
11. Working directly with architects, builders, owners and others in advising on more complete electrical installations in all types of buildings.
12. Creating a more thorough understanding by the public of the labor-saving, comfort-giving and convenience attributes gained from a more extended usage of electricity and electrical merchandise.
13. Striving at all times and in every conceivable manner to increase the use of electricity and the sale of electrical and radio service and equipment.

A Successful Code School for Mechanics

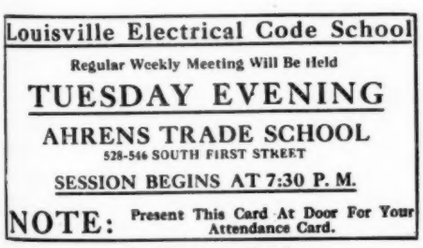
Louisville, Ky., Contractors Sent Their Mechanics to School at a Cost of About 75 Cents a Man—In Fourteen Lessons, These Men Learned All About the Local Code

By F. SHERMAN VOGT,
Secretary-Treasurer, The Electric Club of Louisville

LOUISVILLE has just completed a very constructive activity—a school of instruction for mechanics in the local electrical code. Wiremen know that this work must be done according to certain regulations but few of them really understand these rules. They make few mistakes when the work is of a standard nature, but let anything out of the ordinary come up—and most jobs of any size have something of this nature—the men are likely to be stampeded. If they are not familiar with the rules governing the work and go ahead on their own initiative, the contractor is apt to get a violation in the job and that means extra expense, lost time and reinspection. Nor do the men like to make mistakes. They had much rather know how to do things right. The results of the Louisville school should be very productive—better work and decreased waste. Other cities can well afford to start similar schools.—Editor.

REALIZING the importance of educating the electrical mechanic who actually installs the work, the Louisville Electrical Code School was inaugurated under the supervision of all branches of the industry in the city. The Board of Education readily saw in the movement ultimate benefit to the men and to the public and they gladly cooperated by donating suitable rooms at the Ahrens Trade School for the class of 320 men who enrolled. A committee was formed from the city's electrical organizations, the inspection departments of the Kentucky Actuarial Bureau and the city.

The basis of the course was the local code which was divided into seventeen sections and an instructor assigned to each section. The instructors who were selected because of their experience with the subject, prepared their code assignment and really enjoyed the discussions it afforded them with the men who were also versed in code usages and common practices. The contractors realize that the school will not only do much in correcting mistakes in construction work,


Louisville Electrical Code School
Regular Weekly Meeting Will Be Held
TUESDAY EVENING
AHRENS TRADE SCHOOL
528-546 SOUTH FIRST STREET
SESSION BEGINS AT 7:30 P. M.
NOTE: Present This Card At Door For Your Attendance Card.

Notification Card

but will save many reinspections, and best of all, help the contractor solve many of his worries by having efficient mechanics capable of neat, efficient installations.

School was held on each Tuesday evening and classes began promptly at 7:45 P. M., ending at 9:00 P. M. The students were marked on attendance. To check this attendance, postals were sent to each man and he in return, submitted this postal for his attendance record.

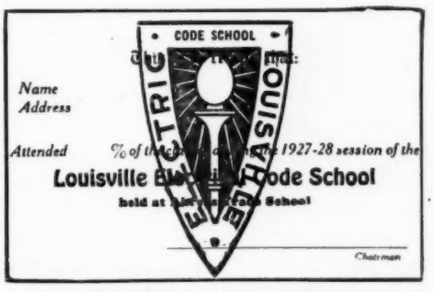
The card was sent to each man on Friday evening in order that the student might have it before him Sunday and Monday. I firmly believe that without such a general notice, the school would not have been as successful. Besides using the same style notice every week, cut down the cost on printing because of the standard form.

On account of the large number enrolled, the services of three instructors were required each evening. These instructors had different subjects but taught for three successive nights. The school for enrollment was divided into three sections, A, B, and C, which was marked on the postal, thus keeping the classes intact.

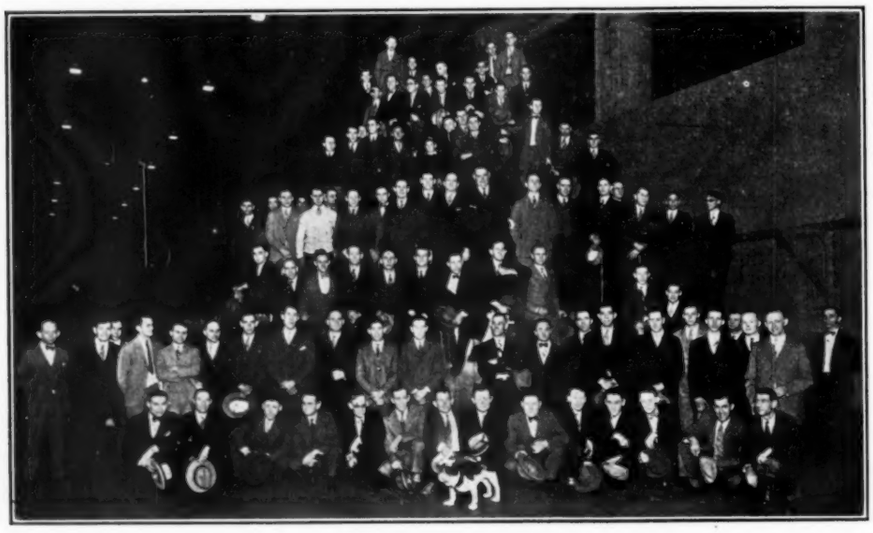
The lessons were seventeen in number, obtained from that number of the sections in the local code; for example, the first lesson included explanation of the local laws or legal section and services and so on, throughout the code. All lessons were of a discussional nature, the instructor going through his allotted lesson first, paragraph by paragraph, using the blackboard where the occasion demanded and at the finish of his subject questions were in order. The students were also informed that any questions might be mailed to this office and they in turn were discussed at the next evening of school. There was no actual work done, for the reason that all men attending had had considerable experience. The men were rated upon their attendance. It was intended that they be rated on attendance plus an examination, but because the vocational school was closed, the examination could not be given. The questions were to be compiled from four questions submitted by each instructor. All instructors formed a board to select questions and grade papers.

The course, planned to run nineteen weeks, lasted fourteen weeks. All the men attended on their own time, yet I understand that some shops offered special inducements to their men in the form of prize money, to those who made a satisfactory grade.

Very little persuasion was used to get the men to attend. They felt that it was



Certificate of Attendance



Graduates of Louisville's Code School

a privilege to be able to attend the school. Strict records were kept and the contractors were very much interested in the attendance of their men.

At the graduation of the school, May 1st, a lunch was served to the men who made a passing mark in attendance, of which there were 130. This included 31 with a 100% attendance. Each man having 100% attendance was given a flashlight, while every man received a card certifying he had attended school, and giving his record. The lunch was held at the hydro-plant of the Louisville Gas and Electric Company, which invited the men as its guests. Motion pictures were shown, after which an inspection was made of the plant.

The cost of the school was borne by the contractors who were assessed upon the number of men that registered from their company, or under their employ. Very little advertising was needed for the school and the money set aside for that purpose was used for posters which were distributed to all the shops, calling attention to the school and the schedule. Detailed statements of disbursements follow:

Display cards	$ 11.50
Postals and printing	52.10
Janitor service	14.00
Instructors' luncheon	24.00
Rubber stamps	3.25
Address plates	15.44
Prizes (flashlights)	21.94
Record cards	3.75
Class luncheon	93.75
	$239.73

With 320 men registered, the cost per man was about 75 cents.

Status of Conduit Standardization

Question as to the Necessity for Both White and Black Conduit is Unsettled

AT their recent convention, Iowa Electragists again went on record as endorsing the standardization of rigid conduit of the white type and urging the A. E. I., manufacturers, wholesalers, and all others interested to work to this end.

This subject has been actively before the Association of Electragists for the past four years or more. In 1924, a committee of the A. E. I. canvassed the members to learn their wishes, with the following results:

Out of 326 who returned questionnaires, only 28 thought there was any reason for the use of black conduit in preference to white other than price, while 198 claimed there is no reason. It was found that 194 of those answering the questionnaire carry both black and white stock while 132 carry white only. But 10 members preferred to use black pipe while 315 preferred white only.

Later the Electric Supply Jobbers' Association became interested and presented the matter to the Bureau of Simplification of the Department of Commerce. The bureau requested a broad survey of architects and engineers, in order to learn whether or not there has been a broad demand for such standardization.

Such a survey was made by the Association of Electragists and replies to its questionnaire were received from 97 architects and engineers of standing and widely scattered geographically. A tabulation of the replies disclosed the following:

Number of replies received	97
Favoring one standard	94
Believing both types needed	3
Prefer white pipe	63
Prefer black pipe	19
Either type satisfactory	12

Thus 77 percent preferred white, 20 percent black, while only 3 percent believed both types necessary.

This information was presented to the bureau of simplification at Washington which began to study the situation. The bureau, however, was unable to interest the manufacturers in the subject.

Furthermore, the Bureau of Simplification felt that they were in a most unusual position in attempting to bring about this standardization.

In most cases the standardization or simplification of types the process is one of reducing a large number, sometimes several hundred different types, to a smaller number, sometimes only a very few.

But in this case the process of simplification is one of reducing two types to only one, and in selecting for that one type the higher priced material and eliminating the cheaper material. Regardless of the many factors in favor of such standardizations upon the higher type of material, the Bureau of Simplification felt that it was an unusual situation and that in view of all the conditions they were not justified in going further with the matter.

This has closed one of the most necessary steps in bringing about such simplification in types through uniform practice of manufacture.

The only remaining method of bringing about such standardization apparently today is through general industry agreement, by publicity, or otherwise, that this is a very desirable and needed step.

Chats on the National Electrical Code

A Monthly Discussion of Wiring Practice and Questions of Interpretation, Presented with a View Toward Encouraging a Better Understanding of the Industry's Most Important Set of Rules

Conducted by F. N. M. SQUIRES
Assistant Chief Inspector, N. Y. Board of Fire Underwriters

Flexible Cord Abuses

Flexible cords are coming in for a good deal of abuse these days. This has been heightened recently by the advent of numerous appliances such as refrigerators, oil burning equipments, automatic stokers, blower systems, etc.

Rule 612-b reads: "Flexible cords shall be used *only* for pendants, wiring of fixtures, *portable* lamps or motors, *portable* heating apparatus, or other *portable* devices."

This, excepting for a few other restrictions, such as for show window work, very clearly defines the allowable uses of such cords.

The average household type of refrigerator is provided with wheels on which it may be moved and is, therefore, portable and may therefore be connected to the circuit by means of flexible cord. But we often find the refrigerators of a type having the motor, compressor and condenser coils in the basement with the copper tubing running upstairs to the refrigerator where the chilling takes place, also connected with flexible cord. While it is true that this device may not use more current than the one first mentioned as the motors may be of the same size, yet it is clearly *not* portable and should be connected in a permanent manner to the circuit.

The same argument holds true in oil burner and blower equipments. Some are designed to be portable and others are clearly and definitely not portable but are permanently fixed in place.

It should also be borne in mind that in general and especially where the portable device is used in basements, that the conditions call for the use of the heavy duty or type S cord.

"Burnouts and Kindred Failures"

The problem in the commercial use of electric currents, as far as satisfactory operation of circuits and apparatus is concerned, is one of di-electrics. It is similar to many other engineering problems where pressures are involved.

In the generation of steam, the strength of the boilers and piping is of primary importance. Hydraulics also has this feature to contend with, and architectural engineering is stuffed full of mechanical stresses where the strength of materials enter as a limiting factor of safe design.

In electrical engineering, the strength of an insulator is known as di-electric strength, and whether it is air or a solid insulating material, there must be a satisfactory margin of safety provided to care for abnormal as well as normal operation of the apparatus.

Recently, we investigated a failure in an automatic sub-station. It occurred at the auto-starter on a 220 volt 60 H. P. motor. The engineer in charge of the sub-station very truthfully stated that such failures are not at all uncommon and wondered why this Bureau should be concerned in making a report on a matter that is taken for granted in the electrical engineering profession, as a part of every day operating practice.

We grant that insulation failures are a common occurrence, entirely too common to be viewed with pride by the designers of electrical materials and apparatus. If steam boilers, gas and water piping, building frames, power dams and other classes of commercial construction were never to be considered dependable, there might be some excuse for making electrical apparatus of questionable quality.

We hear engineers remark that a type .... switch is not to be depended upon. A certain type of auto-starter gives incessant trouble. As a rule, flash-overs occur at brush-holders. Insulation failures of wires and cables are always occurring and there is no end to the electrical troubles of an industrial plant. Some of the trouble is no doubt due to lack of proper maintenance. In fact, a great deal of the trouble is due to improper care of the equipment, but when equipment is properly maintained, there should be some assurance that it will function in its intended manner until ordinary wear and tear destroys its efficiency.

An auto-starter used with a pump motor, if of the automatic type, should be so designed that by alternately turning on and off the load before the full load voltage is applied to the motor, would not cause it to blow up. An automatic fire pump panel should be particularly fool proof in this respect, whether it is of the resistance or auto transformer type.

Our investigations of insulation failures, air or solid di-electric, seems to prove that there is evidently a very small factor of safety allowed, and that cost alone seems to be the first consideration in designing some electrical apparatus.

It is gratifying to see through this maze of commercial activity and view some electrical apparatus that stands up like a mountain of stone. The manufacturers of this class of material do not market it on a price basis. They are evidently prosperous and seem to enjoy a market among customers who realize that time wasted in shut-downs from electrical failures is in the long run more expensive than the extra cost of high grade electrical equipment. We can recover almost anything but time. A few seconds lost at the factory may mean the loss of an order or customer and determine the life and death of the factory.

GEORGE WELMAN.

Vapor Proof Fixtures and Equipment

The Underwriters' Laboratories, Inc., approve a line of fixtures that are made by a number of different manufacturers for use in explosive atmosphere. Most of the fixtures have cast metal bodies, but some are of sheet metal. There should be no argument about the superiority of the cast metal type. These fix-

tures are provided with gaskets between the outer globe and the holder, to prevent the entrance of gas within the lamp enclosure, or rather affords some degree of protection to prevent the lamp from breaking and igniting the gas in the rooms where the fixtures are installed. The latter differentiation is probably the correct one, because the Code does not require the fixtures to be installed or made so that gas will not enter the outer globe through the conduit to which the fixture is attached.

At times, we have suggested stopping the end of the conduit with sealing compound, but a compound that will not crack or melt, and that can be readily applied, is rather hard to find. Perhaps some form of stuffing box would answer the purpose. Explosions may be propagated through pipes, such as conduits, and conduit installations are rarely gas tight. The real purpose of the outer globe then appears as a mechanical protection to the lamp within it and not to prevent explosions.

Explosion Proof System

There remains a lot of constructive work to make explosion proof fixtures and explosion proof conduit systems. The explosion proof motor does not prevent explosions within the motor, but is built to retain the flame and gradually relieve the pressure within, after an explosion occurs. It strikes us that this system of construction might be applied to raceways, *i. e.*, conduit systems, and also to fixtures. The ordinary conduit system with threaded fittings and cast boxes and covers might be built strong enough to hold the explosion and gradually relieve the pressure through fine openings. Fixtures might be likewise constructed, but the best that we can say for the present type of construction is that it affords a reasonable amount of protection from mechanical injury to the lamp. The gas within the fixture will not explode from the lamp, unless the incandescent filament comes in contact with the gas, or unless there is a loose connection at the socket or the wire terminals. A gas tight job of wiring, or at the fixture, is practically impossible, almost as difficult as making a gas tight motor, and even if it were possible to make a vapor proof fixture gas tight, ten chances to one the user would lose the gasket or fail to screw the globe up gas tight after the first lamp change. Probably he would do worse than this, and leave the outer globe off altogether.

It strikes us that some mighty fine engineering is necessary to make an electrical installation safe in a place where the atmosphere is explosive. The slightest arc in a conduit system may cause an explosion. The best method of procedure, as I see it, would be to follow the explosion proof motor principle and make the fixture and the conduit system of such heavy construction that the explosion would be retained within the electrical system and not extended over the entire premises.

Extensive laboratory tests with completed electrical installations would be necessary to determine exactly what class of electrical construction would retain explosions and we doubt if any such tests have ever been made, or if any of the present equipment is explosion proof. Probably one reason that explosions have not resulted more frequently when arcs have occurred, is because the gas and air mixture was not actually explosive; and some explosions that may have been recorded as of unknown origin should reasonably be attributed to arcing in electrical systems.

The best construction that we have at present, for places where explosions are likely to occur, is an ordinary rigid conduit system, with the lamps protected from mechanical injury by outer globes. This is a rather poor showing, but it is taking the usual chance in industry.

Conscience Relieved

A certain gasoline plant was inspected by the writer. We were very careful to require a good grade of conduit construction and vapor proof globes. Of course, we realized that while this was the best the market afforded, it was not 100% safety. It was just about like storing powder, dynamite and priming caps alongside of each other in the same building and that no one would set off the caps; but just as we were leaving the back door we noticed in the same building an open gas flame for heating soldering irons. Which was quite a relief for an electrical inspector's conscience.

Electrical construction of the present type in explosive atmospheres introduces a certain hazard, but the hazard is not greater than many other operations that are not electrical. This is probably the reason that explosion proof electrical equipment has not been developed.

As we gradually place greater safeguards of all kinds around operations in hazardous places, it is reasonable to suppose that electrical construction will also be improved. This little article is written mainly to show that there is room for improvement, and that some manufacturers following the start given by explosion proof motors and control equipment might design a complete explosion proof line of electrical construction apparatus and make it of such a character that it can be maintained in its original safe condition.

GEORGE WELMAN.

Master Switch for Electric Range

Rule 1602-e (1925) requires that each electrically heated appliance of more than 1320 watts total capacity be controlled by an indicating switch readily accessible. 1602-f goes on to say that a receptacle and plug may serve in lieu of the master control switch but, of course, as attachment plugs are used only with flexible cord this reference is only to portable heaters. Other types would require the indicating switch.

Many inspection departments have ruled that this required that a master switch for an electric range be installed within sight of or at the range. This, of course, was not the intent of the rule providing there was a switch which would disconnect the range. This was often the case as in many places the feeder or sub-feed carrying the range was controlled by a switch. If, however, as in most smaller residence installations switches were not provided on the mains, a master switch would be required at the range itself.

But now the 1928 Code clears up the situation by explaining just what switches are necessary or what ones may be used for protective control of the electric ranges, etc. We, therefore, quote the 1928 Code rule 1603:

"A. Each appliance rated at over 1650 watts shall be controlled by an indicating switch, not a part of the appliance, and which shall disconnect from the appliance all underground conductors of its supply circuit or a single approved attachment plug and connector receptacle of appropriate rating may be used in lieu of a switch. The location of such control means shall be as follows:

(1) It shall be readily accessible to the operator of the appliance.

(2) In other than dwelling occupancies, it shall control only the appliance.

(3) In multi-family (more than two) dwellings a switch shall be within the apartment or on the same floor as the

apartment in which the appliance is installed and may control lights and other appliances.

(4) In two-family dwellings a switch may be outside of the apartment in which the appliance is installed but must be readily accessible. This will permit the individual service switch for the apartment to be used provided it is accessible to the user of the appliance.

(5) In single family dwellings the service switch may be used for this purpose.

B. Where the switch controls a motor-operated appliance, it shall be within sight of the appliance.

C. Switches controlling the individual units of electrical appliances shall not be considered as taking the place of the indicating controlling switch required in paragraph A of this section.

D. Each portable electrical appliance shall be equipped with an approved plug connector so designed that the plug may be pulled out to open the circuit without leaving any live parts so exposed as to render likely accidental contact therewith. The connector may be located at either end of the flexible conductor or inserted in the conductor itself."

Some inspection departments have already interpreted the present (1925) Code to allow of the construction called for in the 1928 Code. Therefore, we feel that anyone wishing to take advantage of the latter ruling will not in any way be violating the 1925 Code. Therefore, probably most inspection departments would approve of jobs at the present time if installed according to requirements of our new Code. Anyway, in case of doubt be sure to ask as all inspection departments are always very willing to cooperate in every way possible.

Interpretation No. 10

Question: It is desired to install in a doctors' office building and laboratories a signaling system on a 110 volts with 10-watt lamps. The lamps to be located at 23 different locations and controlled from one control board having 15 switches, each switch controlling 30 lights which will light at the 23 locations, some of the locations being double-face enunciators; the calling being done by combination of lights and colors.

Should an installation comply with appropriate provisions of Articles 1 to 19 inclusive, especially 5 and 8, or may it be considered as covered by the provisions of Article 60 and the Regulations for Signaling Systems?

Answer: The installation described would not be a signaling system under the intent of the National Electrical Code unless supplied by a small battery, individual motor generator, or by a special service board as provided in the Signaling Rules. On the basis of the information given, Articles 1 to 19, especially 5 and 8 are considered to apply.

Interpretation No. 11

Question 1: Where oil filled transformers having a primary voltage of 2300 volts are installed within vaults in buildings other than central stations or substations does Article 50 of the National Electrical Code require these vaults to be vented direct to outside air or can they be merely vented into the building in which they are located?

Finding: The Code does not specify the location of the point of discharge or intake of vents or ventilators to transformer vault.

Question 2: If vaults are permitted to be vented into building in which they are located does Article 50 require the ventilating outlet or inlet to be equipped with automatic or manually operable dampers or shutters to prevent emission of smoke or fire?

Finding: This ventilator opening, as described, should be equipped with automatic or manually operable dampers or shutters to prevent emission of smoke or fire.

Question 3: In the Committee's opinion, should oil filled transformers within vault catch fire and the inlet and outlet vents be tightly closed, would an explosion hazard present itself?

Finding: This is not a proper question for the Interpretations program since it does not refer to textual provisions of the National Electrical Code.

Interpretation No. 12

Question: A 2200-volt 3-phase supply enters a transformer room from the point above its roof and within the room is bused to serve 2-KVA transformers, one in each of two phases, and to supply in addition a 2200-volt 150-HP across the line motor which is controlled from a switchboard on which is an automatic circuit-breaker and additional appropriate equipment. Outside of the transformer room the motor circuit is in conduit under a concrete floor until it reaches this switchboard.

2200-volt fuse cutouts are located inside of the transformer room in the leads to the two transformers and in each of the three leads of the motor circuit. The arrangement contemplates subsequent installation of a third 50-KVA transformer within the transformer room. Upon a side wall adjoining and above the roof of the transformer house, the incoming service wires have fused cutouts installed in each phase.

The question is, does the National Electrical Code specify that additional circuit-breakers be installed in lieu of or in addition to the fused cutouts provided as described?

Finding: The installation as described satisfies the requirements of the National Electrical Code. The installed transformer capacity is not in excess of 50-KVA per phase. The supply of the motor can appropriately be regarded as outside of the building and already has the specified circuit-breaker protection.

Interpretation No. 13

Question 1: With respect to tables in 503-m of the 1925 Code, what is a complete conduit system?

Finding: A "complete" conduit system, as far as is covered by table 503-m, is any installation of conduit other than "short sections of conduit used for the protection of exposed wiring for mechanical injury" referred to in 501-o.

Question 2: When service entrance wires are run in conduit to the service entrance switch, the interior wiring being done by another method of wring, can the conduit run for the service wires be considered a "complete conduit system"?

Finding: Where service entrance wires are run in conduit to the service switch and the remaining portion of the wiring is other than conduit, the service conduit is a "complete" conduit system.

Question 3: What size of conduit suits the requirements of the National Electrical Code for a service entrance run consisting of three No. 6 stranded double braid R. C. wires when the wiring inside of the service entrance equipment is *not* done in rigid conduit?

Finding: For three No. 6 stranded double braid rubber covered wires the size of conduit required by the Code is 1¼ inches.

The Electragist

Official Journal of the
Association of Electragists—International
S. B. WILLIAMS
Editor

The Twenty-Eighth

A lot of water has flowed over the dam since the first national convention of electrical contractors in Buffalo in 1901. For the first few years the problem was one of organization—building and welding together into one body the contractors of the country.

In those early years the thing that every trade association aimed to do was to secure extra favorable terms for members. The Federal Trade Commission, however, has termed this discrimination, and contrary to Federal laws.

Then came a few years of intensive work on standards and important business tools for contractors. In those years we brought forth the Standard Wiring Symbols, The Standard Accounting System and the first Manual of Estimating.

In the last five or six years we have turned our attention more to the problems of trade relations. We have tackled this problem from the economic angle and this year we approach at the Chicago A. E. I. Convention the climax of the struggle.

Previous years have been the preliminary years so necessary to lay the groundwork for any important forward movement. And now we seem almost on the threshold of really going ahead as an industry—appreciative of each other's problems and ready all to do our share to forward the industry's progress.

The electrical industry has its greatest years immediately ahead of it. The development in the past, great as it has been, will pale before the development now coming. But only a united industry can accomplish big things—and we are learning that lesson.

There is a greater spirit of tolerance in the air, more friendliness, more evidences of wanting to play ball. The signs are most encouraging to those who have struggled to bring it about.

The twenty-eighth convention of the A. E. I. and its immediate predecessors are high spots in this development.

League Membership

In every city there are two kinds of contractors—the regular and the curbstoners. The regular contractor belongs to the league and his local trade association and generally takes part in local progressive activities. The curbstoner is not identified with anything outside his own business. He has no business principles and is content to play a lone hand.

To which of these groups should go any business fostered by the league or any interest in the league? If the power company has work to be done, which group should get it?

Business can be hard-boiled and let the lowest man get the job, but not if cooperative effort is worth anything.

A local electrical league is nothing if the contractors are not a part of it and are behind it. Their membership and support is necessary if the league is to be successful. Therefore, for their support they should be recognized to the exclusion of all others when it comes to giving out electrical work by other league members.

It is almost unbelievable that the electrical industry will rave about the curbstoner and curse the day he was born, but when any work is to be let will encourage him to bid and will give him the work if he be the lowest.

Let's let league membership mean something more to the contractor than just being a good fellow.

Slaves

Are the electrical contractors bosses or slaves in their own business?

This is a fair question, because, as owners, one would naturally expect them to run the show. But no, they let their competitors run their business. They are slaves to those against whom they are pitted in the battle of business.

A contractor cuts his price—knowing he can make no profit—because if he doesn't take the job his competitor will. He lets his competitor make his price for him.

But then, slaves never make any money. What they have belongs to their masters.

Spineless contractors belong to their competitors and, so long as they do, will never get very far ahead.

Outlet Campaigns

One by one local "additional outlet campaigns" come to an end and are pronounced "duds". With possibly one exception the results have been too small to justify the time, effort and money expended.

It is doubtful if additional outlets as such could ever be campaigned to the public successfully and at a profit to the industry.

However, the results of these local campaigns, though unsatisfactory to the promoters, are very much worth while to the industry at large, because they prove that the rewiring

of the homes of the country is not to be accomplished piecemeal and by campaigns.

We could campaign unwired homes because there was nothing there to start with. To ask a person, however, to materially alter and add to his present wiring is a different kind of selling job. It can be done only by a long continued education of the public.

When we sold old house wiring we found a public already with the desire to have electricity. The public does not today have the desire for an improved and larger wiring job. This desire must be created and that is our first job.

The industry is hungry to have a national rewiring program begin, but in our eagerness to make progress let us not make plans that do not fully consider the public we wish to sell. The Industry Sales Conference has taken this into consideration and has engaged a competent authority to study the situation with the expectation of finding out how best to approach the problem.

Those cities which have had an additional outlet campaign need not be discouraged because the aggregate number of outlets sold was so small. There were other results which, while not visible perhaps at the time, are nevertheless worth while. For one thing, the public has been asked to think about its wiring and undoubtedly some seeds have been planted that will ultimately result in orders. And for another thing, it has brought the industry together to do an industry job.

Apprentices

In a bulletin on apprenticeship in building construction the Department of Labor most frankly points out that the individual contractor is chiefly responsible for the shortage of apprentices and the absence of a training system.

It isn't that the contractors are opposed to apprentices because they must realize the importance of having well trained young men come into the industry to take the place of the journeymen who for one reason or another go out. The difficulty probably is that the contractors do not care to bother with boys during the training period.

Somebody must take over these boys and see that they get the right training. If the majority of contractors willfully shirk their duty in this respect they are hurting their own future. Can't some scheme of apportionment be worked out and then lived up to?

The Appeal of Luxury

The competition that electric service is meeting today is that of other luxuries. Those other luxuries are being sold to the public, not as necessities, but for what they really are —luxuries. The appeal is not price, but comfort, ease, beauty, pride of possession.

The home is the place where American people satisfy most of their desires for luxury. The price of that luxury cuts little figure once the desire is created.

Other trade groups in approaching the American public have understood this principle. Their argument has always been "how nice" not "how cheap." They have created the desire to possess.

Let us stop talking about how cheaply we can wire homes or outlets—let us talk how much comfort, ease, etc., etc., will come from adequate wiring.

The luxury appeal has a taking way with the American public. We recommend it to the electrical industry.

Building Records

Reports from a number of sources show the total volume of new construction is ahead of last year. How long will we continue to pile up new volume records? Some economists are pointing to the high money rates with a warning.

The electrical industry need never fear a slump in new building if it will only tap the great under-wired building market and foster re-inspection.

Entrance Sizes

When the new 1928 National Electrical Code was revised the entrance wire size minimum was changed from No. 10 to No. 8. That was a step in the right direction. But even No. 8 is small for adequate service to modern homes.

Of course, there will be small, inexpensive dwellings—2 circuit jobs—where a No. 10 is perfectly satisfactory, but No. 8 costs hardly any more than No. 10 and gives better regulation.

As the use of heavy duty appliances increases No. 6 will become a necessity. If to use such appliances a new service of larger size has to be installed the cost may frequently seem to be out of all proportion.

There is quite a difference in cost between a No. 10 and a No. 6 entrance, but it will be economical in the long run to have the larger entrance installed in the beginning.

It would seem advisable for a sub-committee of the Electrical Committee to study the entrance conductor size problem and make recommendations. The minimum may be allowed up to and including three circuits or there may be a controlling floor area factor.

Whatever is correct and proper let us have it, but let us point towards a No. 6 minimum.

Why We Do It

Every now and then a manufacturer of high reputation brings out a wiring device that cannot be approved and tries to market it. In a number of instances the advertising of such devices has been offered to THE ELECTRAGIST and we have consistently refused to carry it.

We do not attempt to set ourselves up as any court, nor do we care to be arbitrary. We do believe, however, that it is not consistent to fight for approved material in our editorial pages and at the same time accept money for advertising products that are out of step with the Code and everything else that is good practice.

Products of that nature that cannot be approved are dangerous—they are positive fire hazards. We cannot and will not be a party to the promotion and sale of such devices.

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MINNESOTA		
Duluth (L)	Morris Braden	c|o Minn. Pow'r & Lt. Co.
Minneapolis (C)	W. I. Gray	209 Globe Building
MISSOURI		
Kansas City (C)	Walter C. DeBold	City Bank Bldg.
St. Louis:		
Electragists' Ass'n (C)	Carl H. Christine	1042 Telephone Bldg.
Electric Employers' Association (C)	A. W. Van Nort	Railway Exchange Bldg.

STATE AND CITY	LOCAL SECRETARY	STREET ADDRESS
NEBRASKA		
Lincoln	J. E. Shuff	1400 "O" St.
Omaha (C)	E. H. Brown	1818½ Harney Street
NEW JERSEY		
Jersey City (C)	John Nairn	38 Oakland Ave
Long Branch (C) (Asbury Park and Red Bank)	Austin Hurley	Campbell Ave., Long Branch
Paterson (C)	H. L. Jaycox	188 Ellison St.
Philipsburg (See Lehigh Valley, Pa.)		
Prospect Park (C)	Leonard De Block	Hopper St.
Union City (C)	Frank Zeller	328 48th Street
NEW YORK		
Buffalo (L)	Samuel S. Vineberg	307 Electric Bldg.
Jamestown (C)	Henry M. Lund	309 Main Street
Nassau-Suffolk (C)	Henry T. Hobby	55 Front Street, Rockville Centre, L. I.
New York City:		
Section No. 1 (C)	Walter Knapp	207 East 43rd Street
Independent (C)	John J. Bauer	157 E. 51st St.
Metropolitan (C)	George W. Neil	96 Beekman St.
Niagara Falls (C)	E. M. King	515 Niagara Street
Rochester (C)	G. Fred Laube	Laube Electric Co.
Rochester (L)	Henry F. Burton	89 East Ave.
Schenectady (C)	Richard Spengler	421 McClellan Street
Syracuse (C)	Fred P. Edinger	802 East Water St.
Utica (C)	W. C. Ballda	228 Genesee Street
Westchester Co. (C)	Jack Lalley	14 Mnr. Hse. Sq., Yonkers
Yonkers (C)	Louis Mayer	485 South Broadway
OHIO		
Akron (C)	E. C. Rishel	540 East Avenue
Canton (C)	H. S. Hastings	301 New Vickery Bldg.
Cincinnati (C)	J. F. Riehle	1642 Cedar Ave.
Cleveland (C)	F. T. Manahan	Chester Twelfth Bldg.
Columbus (L)	O. A. Robins	1242 Oak Street
Dayton (C)	Clarence Carey	1107 South Brown St.
Lorain (C)	A. B. Walton	3150 E. Erie Ave.
Toledo (C)	Fred C. Dunn	Builders' Exchange
Northern Ohio (C)	R. A. Wentz	Elyria
Youngstown (C)	L. M. Robinson	Mahoning Bank Bldg.
OKLAHOMA		
Pawhuska	C. G. Sego	Pawhuska
OREGON		
Portland (C)	J. R. Tomlinson	51 Union Ave., N.
Portland (C)	C. K. Mowrey	120 Grand Ave.
PENNSYLVANIA		
Altoona (C)	Walter Bracken	Leechburg
Allegheny Valley	E. G. Jackson	12 West Third Street
Allentown (C)	E. W. Weaver	805 Chew St.
Easton (L)	H. Clark Kreider	Arcade Bldg., Center Sq.
Erie (C)	R. D. Goff	11th and French Sts.
Philadelphia (C)	M. G. Sellers	1202 Locust Street
Pittsburgh (C)	D. A. Fleming	518 Empire Bldg.
Wilkes-Barre (L)	Leon N. Sell	Town Hall
RHODE ISLAND		
Providence (C)	H. E. Batman	36 Exchange Place
SOUTH CAROLINA		
Charleston (L)	J. P. Connolly	141 Meeting Street
SOUTH DAKOTA		
Sioux Falls	H. W. Claus	326 S. Phillips Ave.
TENNESSEE		
Chattanooga (L)	P. W. Curtis	725 Walnut Street
Knoxville (L)	Jerry G. Cason	303 West Church St.
Memphis (L)	J. J. Brennan	179 Madison Ave.
Nashville (C)	J. T. Shannon	c|o Electric Equip. Co.
Nashville (L)	F. H. Tathwell	Nashville Ry. & Lt. Co.
TEXAS		
Beaumont (C)	J. A. Solleder	Houston & Bolivar Sts.
Dallas (C)	P. B. Seastrunk	2032 Commerce St.
Houston (C)	J. A. Kibbler	----------
UTAH		
Ogden	B. Kristofferson	2249 Washington Ave.
Salt Lake City (C)	R. E. Folland	Newhouse Hotel
VIRGINIA		
Norfolk (L)	A. W. Cornick	200 Plum St.
Richmond (C)	E. M. Andrews	15 N. Twelfth Street
WASHINGTON		
Seattle (L)	P. L. Hoadley	Seaboard Building
Spokane (C)	William Stack	W. 1121 Cleveland St.
WEST VIRGINIA		
Wheeling	Peter J. Erb	1414 Eoff Street
WISCONSIN		
Green Bay (C)	V. E. Grebel	531 S. Broadway
Madison (C)	Carl J. Marsh	710 Beaver Bldg.
Milwaukee (C)	E. H. Herzberg	1604 Wells St.
Milwaukee (L)	J. S. Bartlett	443 Commerce Bldg.
Racine (C)	Joseph J. Small	1910 Linden Ave.
CANADA		
Montreal (C)	George C. L. Brassart	674 Girouard Ave.
Vancouver (C)	J. C. Reston	579 Howe St.
Vancouver	J. Galloway	744 Hastings St. W.
Winnipeg (C)	Fred Ball	300 Princess St.
Winnipeg	D. O'Toole	Northern Elec. Co.

(C) designates exclusively Contractor-Dealer organization.
(L) designates an Electrical League.

JULY ACTIVITIES

Electragist Convention to Study Important Trade Policies

Motor Merchandising, Wiring Policies, Electragist Standards, Changes in Constitution, to be Studied

IN three important business sessions, electragists will study vital problems of the organization of the national association, attitude of contractors toward other branches of the industry, electragists' standards and motor merchandising policies.

The first business session, exclusively for contractors and contractor-dealers, will be held August 7. After appointment of committee for the convention, discussion will be held on the proposed changes in the organization and operation of the Association of Electragists. These important amendments to the constitution and by-laws were suggested by the executive committee of the association at the semi-annual mid-winter meeting last February.

Operation Changes

The proposed changes modify the method of operation of the association in rather radical manner and will be very carefully studied by the contractors present at this business session.

At this meeting, C. P. Fuerst, Cleveland, and A. B. Zerby, East Pittsburgh, will report on the electragists' and architects' filing system for manufacturers' catalogs which the committees, of which they are chairmen, have been studying.

S. B. Williams, editor of THE ELECTRAGIST, will address the session on the subject, "Wasted Profits".

The second business session, August 8, will be devoted to discussion and action on merchandising and wiring policies, followed by a report by A. Penn Denton, chairman, electragists' standards committee. Much work has been completed on the electragists standards and those attending this session will have material for discussion and final action.

The labor sections will then hold meetings to discuss their particular problems, the union shop section under the direction of L. K. Comstock, acting chairman; the open shop section under direction of S. J. Stewart, chairman.

An important session of motor dealers and specialists will be held August 7 for a discussion of motor problems and recommendations to the A. E. I. National Motor Section Committee, and on August 10, the National Motor Section of the A. E. I. will hold its own general convention, at which time action will be taken on resolutions and official reports.

New National Electrical Code Approved

In Spite of Negative Votes, N. F. P. A. Committee Approves Final Draft

IN spite of three negative votes, supported by a brief filed by the central station group, the executive committee of the National Fire Protection Association has approved the report of the Electrical Committee and directed that the 1928 Code be certified to the National Board of Fire Underwriters and the American Engineering Standards Committee for approval as an American Standard.

Printing of the new Code will start as soon as possible but copies will not be available before September 1.

According to A. P. Small, Chairman, Electrical Committee, the American Engineering Standards Committee will probably take no action before the Code is printed.

The vote of the Electrical Committee on the new Code was 40 in favor and 3 opposed, the latter belonging to the central station group.

A brief was submitted, by the central station group giving the objections which were primarily against the rules for grounding of portables in domestic establishments. This subject will be discussed at length at the Conference on grounding which will be held this fall, probably in Springfield, Mass., about October 8.

Power Man Gives Wiring Talk

At a meeting of the contractor-dealer members of the Electrical League of Minneapolis, T. D. Crocker, assistant general manager of the Northern States Power Co., gave an informal talk on the attitude of his company in regard to its participation on interior wiring.

He stated that it has been the policy of the Northern States Power Co. not to do interior wiring in competition with firms who are organized to do it and that its policy has not been changed and will not be, as long as the public is given good service at a reasonable cost by the electrical contractors.

Procedure Committee Appointed

The following have been appointed members of the procedure committee authorized at the February meeting of the Electrical committee to study Code procedure: W. H. Blood, Jr., C. S. Cahaskie, A. Penn Denton, G. S. Lawler, R. W. E. Moore, A. R. Small, chairman, ex-officio, V. H. Tousley.

This committee was authorized to:

1. Consider the present membership of the electrical committee to see if the proper organizations are represented.
2. Consider the size of the committee

and what organizations should be represented.

3. Study the best methods for considering Code changes.

4. Study the advisability of restricting voting privileges of those who are bound by commercial considerations.

5. Study methods of improving present procedure.

6. Determine the best method of coordinating the code.

7. Report at the next annual meeting of the electrical committee.

Substandard Eight Progress

The New York City committee on elimination of substandard and hazardous materials, of which Joseph C. Forsythe is chairman, reports considerable progress after a series of meetings and discussions of the problem.

Members of the committee, through conference with managers of department stores and chain selling organizations, have already succeeded in stopping some of the worst outlets for substandard appliances. Two large department stores now call in inspectors from Underwriters Laboratories every time they get a shipment of electrical materials; others notified suppliers that poor materials will be returned.

Underwriters Laboratories have put a full-time inspector on the job of looking for sub-standard appliances in retail stores.

Defends Bond Clause in Ordinances

A recent bulletin of the Electrical League of Utah contained an editorial on the bond clause in the new electrical ordinance which is of interest to all electrical contractors. The editorial follows:

"The constitutionality of the bond clause in our new City Electrical Ordinance is being questioned by *one* electrical contractor. Of course we are not able to determine ahead of the case what the outcome will be. We are hopeful, however, that this very admirable clause will remain in the ordinance. The City should have the power to protect the public against unworthy electrical workers. If they do not have such power now, we should see to it that they get it at the next legislature.

"The bond clause simply means this—when you hire an electrical contractor, you not only know that he has a license to do the work, which implies that he is capable, but it also indicates that you are protected by a one thousand dollar corporate surety bond against fraud or negligence.

"It just naturally follows that if a man is inclined to be careless the bond will impress upon him his responsibility and at least help to cure him. This assures the innocent public of a better grade of work and gives them a confidence which has not always been there.

"For the electrical contractor, it protects the man who wants to and will do good work against the one who desires to be relieved of any and all responsibility excepting to just get by. It helps to elevate the vocation and eliminate the undesirable element.

"If you knew it, you would not place the safety of your home and loved ones in the hands of an electrical contractor who is not willing to assume the obligation or tangible guarantee, if you please, of the right kind of job, would you? Neither would I."

Colorado League Opposes N. E. L. A. Wiring Plan—League Committee Approves Contractors' Objections

A SPECIAL committee of the Electrical League of Colorado agreed with officers and 26 members of the Associated Electrical Contractors, Denver, and officers and 15 members of the Denver Electrical Contractors Association, Inc., in opposing the wiring sales plan recommended by the Commercial National Section, N. E. L. A.

The contractors association states that: "This report leads definitely towards the conclusion that the central stations should enter the electrical contracting business, employing electrical contractors or wiremen as their workmen on a piece work basis and that the cost of conducting such electrical contracting business should be absorbed by the central stations under the advantages which they are now employing in many cases to conduct merchandising departments without regard to costs or profits. Such a policy would inevitably establish the level of contracting and wiring prices in the minds of the public at such levels as to destroy the business of electrical contractors attempting to operate on a normal basis of profit.

"We regard the attitude as conveyed by this report as monopolistic and extremely unfair to the contractor dealer and desire to go on record as being absolutely opposed to the report, and in all fairness and justice to the electrical contractor, we ask the Electrical League of Colorado this definite question:

"Do you approve of this report, and the principals set up in this report, of the wiring committee?"

Beauty is New Sales Appeal

The trend of electrical fixtures is toward beauty and simplicity, according to Irene P. Sidley, secretary of the Women's Interior Decorating Association, who addressed the Artistic Lighting Equipment Association on this subject at the annual convention.

"Wrought iron fixtures I have seen," she said, "have far too many curlicues, in fact some have hanging on them everything but the kitchen stove. The people of this country are becoming more and more educated as to standards of beauty; travel to Europe and other places is opening their eyes to what is being done in art and trade.

"Fixtures used in the remodeling of homes must be simple. The trouble with period fixtures is that we have no strictly period houses to go with them."

Contractors Study License Problems

Electrical contractors of the Niagara Frontier are holding meetings twice a month to study the problem of enforcing the license ordinance. At the first meeting the following aims were agreed upon:

1. For enforcement of licenses.
2. For bringing about better relations with underwriters and city inspection bureaus.
3. For maintaining a credit bureau.
4. To encourage fairer practices among contractors.
5. To develop industry consciousness among contractors.
6. To encourage friendship and co-operation among members.
7. To raise standard of wiring practices and improve price levels.
8. Lastly, to make the business of electrical contracting more profitable in financial and worldly things as well as developing in its members a greater personal satisfaction in their occupation.

The following officers were elected for the contractors' section of the Electrical League of the Niagara Frontier: E. O'Dea, chairman; Hugo Lanelli, vice chairman; Mason Brown, secretary; George Truscott, luncheon program committee.

Ordinance Orders Sign Inspection

Regulations covering the placing of electric signs in Birmingham, Ala., were provided by the city commission when it adopted a new ordinance and amendment to the present electrical code. The new ordinance makes it unlawful for anyone to erect a sign until inspection has been made and permission given to proceed.

League Conference in August

The seventh electrical league conference will be held August 2nd to 7th at Association Island, Henderson Harbor N. Y., under the auspices of the league council and sponsored by the Society for Electrical Development. Reports will be made of league plans, experiences and developments of the past year. Prominent speakers will give a picture of national thinking and working both inside and outside of the electrical industry.

Crouse Heads N. E. M. A.

Huntington B. Crouse, president of the Crouse-Hinds Co., was elected president of the National Electrical Manufacturers Association to succeed Gerard Swope. Mr. Crouse is a charter member of the organization.

Creditosis Discovered

The Pittsburgh Credit Bureau has announced that a horrible disease has been discovered. It is "creditosis". Creditosis is similar to halitosis and means "unpleasant credits". As with its sister disease, even your best friends won't tell you. The first symptom of creditosis is enlargement of the heart, which causes you to extend credit to all applicants without checking them up. It also causes enlargement of the accounts receivable, weakens your credit pulse with the banks and causes your collection department to have a high fever. Can it be cured?

Promote Home Modernizing

A home modernizing bureau was organized in Minneapolis on June 25 by representatives of nearly a score of industries and material and equipment companies identified with residential construction.

A three months program was planned whereby the value of modernizing houses will be emphasized and demonstrated to the public.

Resale Price Fixing Abandoned

A radio manufacturing company has agreed to abandon the following resale price fixing policies as a result of meetings with members of the Federal Trade Commission:

"Entering into contracts or agreements with dealers, whether distributors, jobbers, wholesalers or retailers, to the effect that such dealers or any of them, in reselling the products sold by the respondent, will adhere to any system of prices fixed by the respondent.

"Threatening with civil suit or other suits or refusing or threatening to refuse to sell to any such dealer because of failure to adhere to any such system of resale prices.

"Co-operating with other individuals, firms, partnerships, or corporations in refusing or threatening to refuse to sell to any distributor, jobber or wholesaler because they resold the respondent's products to retailers who have failed to maintain the resale prices fixed by the manufacturer.

"Securing or seeking to secure the co-operation of its distributors or other dealers in maintaining or enforcing any system of resale prices."

Municipal Electricians Planing Convention

Plans are progressing for the next national convention of the International Association of Municipal Electricians, which will be held in New Orleans October 23 to 26. A committee has been appointed to study airport lighting and will give its report on this subject at the convention.

Western Inspectors Convention

L. A. Barley, Denver, Colo., has been appointed "round-up boss" for the annual convention of the Western Section of the International Association of Electrical Inspectors, to be held in Denver, September 10, 11 and 12. Plans are rapidly going forward for the meetings, and the first of several promotional letters have been sent out.

The committee, headed by Mr. Barley, includes: John Keating, John F. Healy, Jay Williams, W. J. Martin, David Reed, James Adams, Dean D. Clark, R. F. Conroy and George E. Lewis.

Red Seal Forges Ahead

A COMPARISON between 25 Red Seal homes and 25 non-Red Seal homes built in the last two years is made by the Electrical League of Milwaukee in the table reproduced below. This shows that the number of outlets in Red Seal homes is approximately 65 per cent greater than in non-Red Seal homes. The survey includes four sizes of houses, those with 2, 3, 4 and 5 bedrooms. Garages are not included.

ANALYSIS OF 25 RED SEAL HOMES AND 25 NON-RED SEAL HOMES

	No. in class	No. Bedrooms	Ceil. Outlet	Wall Brkt.	1-way Switch	3-way Switch	Con. Outlet	Total	Av. Per. Home
Red Seal Homes									
	4	2	108	47	66	33	93	347	86.75
	10	3	277	133	197	132	326	1065	106.50
	10	4	297	225	164	142	305	1173	113.30
	1	5	35	21	24	12	35	127	127.00
	25		717	426		319	759	2672	106.88
Non-Red Seal Homes									
	4	2	57	24	46	6	33	166	41.50
	10	3	200	92	148	34	148	622	62.20
	10	4	242	111	167	57	178	755	75.50
	1	5	26	9	20	6	17	78	78.00
TOTALS	25	..	525	236	381	103	376	164	64.04
Difference	..	..	192	190	70	216	383	1051	42.04
% Increase in Red Seal Homes	..	..	36.6	80.5	18.4	209.7	103.5	64.8	..

Abbott Joins S. E. D. Staff

Arthur L. Abbott, who for the past four years has served as Technical Director of the Association of Electragists, has resigned to join the staff of the Society for Electrical Development, where he will act as technical assistant to Harry B. Kirkland in the promotion of the Uniform Ordinance.

Mr. Abbott is best known as the leading authority in this country on electrical estimating. He originated and compiled the Manual of Estimating of the A. E. I., which is recognized as the only authoritative and comprehensive set of wiring cost data ever published.

Arthur L. Abbott

During the last four years the Cost Data book of the A. E. I. has been completely revised to make it of maximum practical value to members. He has conducted electrical estimating schools in a number of the larger cities and acted as technical advisor to members. He has been in charge of the compilation of the Electragists Standards for Wiring Installation which will be ready in preliminary form in a week or two.

In addition, Mr. Abbott has served as technical editor for THE ELECTRAGIST, his best known articles having been two complete courses in electrical estimating. He also made the Analysis of 1928 Electrical Code Changes now running in these pages and which has received an unusual amount of favorable comment.

Mr. Abbott is an electrical engineering graduate from the University of Minnesota and for a number of years has been a member of the A. I. E. E. The greater part of his business life was spent in electrical contracting. He was for some time associated with W. I. Gray, pioneer contractor of Minneapolis, and later became manager of the Commonwealth Electric Company of St. Paul.

In 1923 he left Minnesota to become sales manager of the Frank Adam Electric Company and the following year joined the staff of the A. E. I.

While a contractor Mr. Abbott took great interest in contractor association work, both local and national, and for years served as a member of the national executive committee. The very nature of his new work will enable Mr. Abbott to continue his usefulness to the A. E. I. members.

Growth of Red Seal in Toronto

The Electric Service League of Toronto reports that the ratio of Red Seal dwellings to building permits in the first four months of 1928 is 80 per cent, compared with 37 per cent in the same period in 1927, and 22 per cent in 1926. There are now 305 Red Seal builders in the district.

Contractors Unite

The electrical contractors and dealers of St. Joseph, Mo., have recently formed the "Electrical Contractors' and Dealers' Association." The officers are: M. E. McKim, president; Harry C. Korns, vice president; H. B. Kitzenberger, treasurer; W. H. Hoecker, secretary.

Light Increases Production

A survey recently made by the electrical league of the Niagara Frontier disclosed the fact that in 37 factories which recently installed improved lighting, 79 percent found production had increased, with the same men and machines. In one company the production increased 10 percent and the owner stated that "the improved lighting has paid for itself in the short space of time we have made the change."

In another plant it was found that "with the change from a spot of light at each machine to a system of general illumination throughout the plant we have increased our wiredrawing production by 21 percent." Raising the lighting value of an automobile piston factory from 1.2 ft. candles to 14 ft. candles increased production by 25.8 percent. The survey also revealed these interesting points: 71 percent of the manufacturers said that scientific lighting reduced spoilage; 60 percent said it decreased accidents; 51 percent said it improved discipline and 41 percent said it brought about an improvement of hygienic conditions.

Merchandise Man Speaks

Samuel A. Chase, special representative of the Westinghouse Electric & Mfg. Co., addressed the Norfolk Electric Club on June 27 on "Selling the Electrical Idea to the Public" and on June 28, spoke to the Lehigh Valley Electrical Association on "Channels of Distribution Between Manufacturer and Consumer."

Uniform Electrical Ordinance Favored in North Carolina

THE local inspectors of seven North Carolina cities and the state inspector, N. E. Cannady, met in April and drew up a uniform ordinance acceptable to them all. This ordinance has been adopted by Charlotte and will probably be accepted shortly by several other cities. Mr. Cannady was largely responsible for this movement in North Carolina.

Several sections of the ordinance are unusual. One section provides that anyone selling within the city limits any electrical device rated at more than 660 watts and to be connected to the city electrical system shall report each sale with the name and address of the purchaser to the electrical inspector of the city.

Another section rules that all wiring installed except in residences and apartments of not more than two apartments shall be enclosed in metal conduit, armored cable or metal raceway.

Cable straps must be used to hold in place conduit, cable and metal moulding, according to the ordinance, which further provides that it is unlawful to bridge a fuse or fuse a conductor above its rated capacity; that, in a store building not more than four ceiling outlets shall be placed on one circuit, and that a range disconnect switch must be on the same floor as the range.

League Features Emblem

Most of the members of the Electrical League of Washington, D. C., have been provided with cuts of the organization's emblem, as shown here, at a nominal

cost. This is in line with the league's publicity policy. Besides these "member cuts" for use on printed matter, members are supplied with decalcomania seals for use in store windows, on trucks and on important jobs. The committee on public information includes N. H. Barnes, chairman, N. O. Houghton, and T. E. Mullican.

On Standards Committee

R. A. Goeller, vice president Hatzel & Buehler, was appointed representative of the A. E. I., to serve on a sectional committee of the Engineering Standards Committee to develop the project of the standardization of switch boxes and outlet boxes.

Milwaukee League Elects

At the annual meeting of the Electrical League of Milwaukee, three directors were elected, Rudolph Knoerr, representing the contractor-dealer group, H. P. Andrea, the jobbers, and F. A. Coffin, the central station. The board of directors then met and elected the following officers: President, H. P. Andrea; vice-president, J. V. Heuser; secretary, N. C. Christopherson; treasurer, T. H. Desmond.

Floodlighting Red Buildings

Colored buildings can now be successfully floodlighted, according to electrical engineers, by the use of colored lenses. One difficulty with floodlighting red buildings has been the fact that red is a poor reflector of white light. The difficulty is overcome when floodlights equipped with red lenses are used.

Illumination Congress Will Meet

The first world congress on illumination will be held at Saranac, N. Y., September 22 to 28. It will be a gathering of delegates from many countries affiliated with the International Commission on Illumination. The program consists of papers by leading authorities including both scientific and practical subjects of outstanding interest in fields not covered by technical committees.

Contractor-Dealer Notes

Hereford Wood and Ralph Schatz have gone into partnership in Ridgeway, Pa., under the firm name of Elco Electrical Co.

A. Neri of Hoboken, N. J., has retired and the business of A. Neri & Co., will be carried on by his two sons, James and Ralph.

M. C. Howie, contractor, has opened a new store in Monroe, N. C.

The Whitestone Electric Co., Youngstown, O., occupies a new store at 710 Market St.

Bender & Scott, Columbia Heights, Washington, D. C., have remodeled their store at 1414 Park Rd., and installed new equipment.

W. T. Clark Electric Co., Rimersburg, Pa., has purchased a building which it now occupies.

What is said to be the biggest fixture installation in Washington at this time is that being done by Evans Bros. Co., of that city, in the new McKinley High School. There will be special lighting in the auditorium and a first class commercial light unit will be used in the classrooms.

The C. C. Bohn Electric Company announces the removal to 55 W. 46th Street, New York City. They have discontinued the retail department, retaining their contracting business.

New Electragists

The following contractor-dealers have made application and been accepted into the A. E. I. since the publication of the last list in the July issue:

ALABAMA

Birmingham:
Ball & Dyer Elec. Co.

Mobile:
John O'Donnell Elec. Shop
Shaw Electric Co.
Sigler Elec. Co.
Victory Elec. Co.

Montgomery:
Dixie Elec. Co.
Montgomery Elec. Co.

CALIFORNIA

Bakersfield:
Wright Elec. Co.

Chico:
Boblet Mfg. Co.

Colusa:
Russell's Elec. Store

Dixon:
Brennan's Electric Shop

Mount Shasta:
Mount Shasta Elec. Co.

Pasadena:
H. L. Miller Co.

Patterson:
G. A. Jaderquist

Riverside:
Backstrand Brothers

San Francisco:
James Elec. Co.

Santa Clara:
University Elec. Co.

Stockton:
Home Wiring Co.

ILLINOIS

Moline:
Moline Elec. Co.

MARYLAND

Baltimore:
The Public Address & Elec. Co.

Halethorpe:
Halethorpe Elec. Co.

MASSACHUSETTS

Springfield:
The Collins Elec. Co., Inc.

MISSISSIPPI

Clarksdale:
City Electric Co.

Columbus:
Doughty Elec. Co.
Cliff Golden Elec. Shop

Greenville:
Wiseman Elec. Co.

Laurel:
The Electric Contracting Co.
Electric Service Co.

Hattiesburg:
E. F. Bainter Elec. Co.

Winona:
W. C. George

NEW YORK

Kingston:
M. J. Gallagher & Co.

New York City:
W. J. Holmes

Woodstock:
Allen Elec. & Sup. Co., Inc.

NORTH CAROLINA

Statesville:
Electric Sup. Co., Inc.

OREGON

Eugene:
Gum & Wells Elec. Co.

Portland:
James Dimitre

PENNSYLVANIA

Hanover:
R. E. S. Swam & Co.

News of the Manufacturers

Sign Receptacle

To the line of sign receptacles of Pass & Seymour, Syracuse, N. Y., has been added an intermediate base size. This intermediate base size allows closer spacing of lamps and finer

curves. The receptacle is equipped with a spring stud which snaps it into place so that it is only necessary to run one screw in from the front.

Master Switch

The Cutler-Hammer Mfg. Co., Milwaukee, Wisc., is making a new switch for use as a pilot circuit control device on lathes, textile machinery and other equipment where starting and stopping of the machine is to be governed by a splined shaft, shipper rod or similar device. Low voltage protection is one of the important features. Should the motor stop, due to low voltage or for any other reason, it will not re-start until the switch has been operated again. The operating lever can be shifted to any one of four positions to suit operating conditions. The switch is designed especially for three-wire control, but can also be used for two-wire control on pilot circuits up to 550 volts.

Spotlight

Kliegl Bros., New York, is now making a spotlight with remote control of color lenses made possible by an electro-magnetic device on the fixture. The color lenses can be operated separately or simultaneously.

Appliance Plug

The Eagle Electric Mfg. Co., Brooklyn, N. Y., has placed on sale a plug with an ar-

mor-clad phospher bronze wipe contact clip. It designed to fit all American made appliances.

Outdoor Meter Box

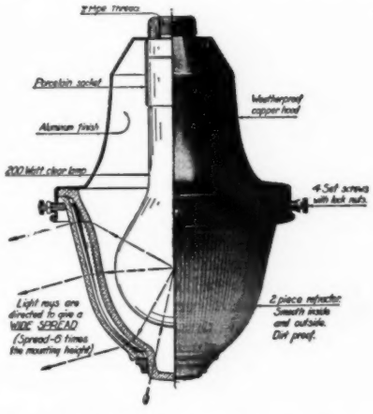
A new type of meter box, designed to be mounted on the exterior of residences, has been announcd by the Square D Co., Detroit. The case is of 16-gauge steel, electrically welded, with window glass cemented in. The assembly includes a 60-amp. test block, a sealing stud at the bottom of the box, a meter board of wood which permits the mounting of meters with differently spaced mounting holes. Two steel strips are welded to the back of the box, offset to hold it away from the wall. In use, the distribution fuse box and service entrance switch are still installed in the basement. Service is brought from the pole directly to the meter box, mounted at a convenient location on the outside wall of the house.

Receptacle

The Bryant Electric Company is distributing a new receptacle for mounting in canopies with composition body and lug to prevent rotation. It is also made with the new "finding rib." The face of the receptacle is concave and has a rounded composition rib between the slots, a combination which makes insertion of the prongs of the cap easy. The device is held in position by a screw ring on the body behind the canopy. It has the rating of 10 amp., 250 volts.

Fixture

A wide spread light for general outdoor use is announced by the Holoplane Co., New York City. The new light has been especially designed to spread the light over wide areas.


Porcelain socket
Aluminum finish
200 Watt clear lamp
Weatherproof copper hood
4.5sf screw with bolt nut
2 piece refractor Smooth inside and outside. Dirt proof.
Light rays are directed to give a WIDE SPREAD (Spread-6 times the mounting height)

It is said to be weather proof and dust proof. Its use is suggested for lighting driveways, shipping platforms, filling stations and other large areas. It uses a 200 watt clear lamp.

Pipe Reamer

The Toledo Pipe Threading Machine Co., Toledo, Ohio, has added a ratchet pipe reamer to its line. The cutter blades are cast in the head, which is renewable. The ratchet head is enclosed and the handle is designed to provide a natural position for holding the reamer.

Street Lighting Equipment

Two new catalogs on street lighting equipment have been published by the Westinghouse Electric and Mfg. Co. "Overhead Street Lighting Equipment" applies strictly to utilitarian street lighting systems in which the current is carried to the units by overhead wiring. "Ornamental Street Lighting" devotes almost half of its pages to pictures and dimension line drawings of lighting standards.

Lantern

The Murlin Mfg. Co., Philadelphia, has designed the new colonial lantern shown here. It is designed to harmonize with the architecture of colonial style homes or apartments. It is made in two sizes, 9"x22" and 6¾"x16½",

allowing its use for both main and side entrances. It is hexagonal and has a hinged glass door in the bottom.

Wire Connector

The Ideal Commutator Dresser Co., Sycamore, Ill., is about to market a large solderless, tapeless wire connector to be known as the large universal type. It will take all combinations of wire from 4 No. 14 to 3 No. 10 wires. The standard size connector will take care of most common combinations from 2 No. 18 stranded to 4 No. 14 solid or 2 No. 12 solid.

Cord Set

Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., is making a cord set with an extended handle designed to prevent broken

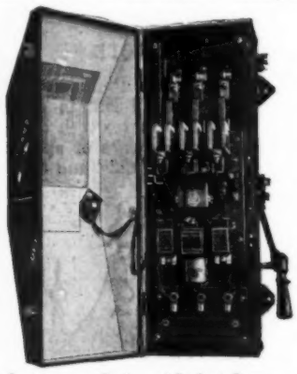
cords. It is claimed that the handle will not get overheated. It is furnished with or without switch.

Convenience Outlets

The General Electric Co. announces the manufacture of convenience outlets with wide mounting ears. They are made in brown and black.

Motor Starter

The Allen-Bradley Co., Milwaukee, Wis., has added to its line of motor starters a new resisto-transformer starter. It is described as a combination of the graphite compression resistor and the autotransformer (compensator



type) of starters. It is said that large squirrel cage motors can be started without causing line voltage jolts or dimming of lights combined in the same network.

Unit Receptacle

The Connecticut Electric Mfg. Co., Bridgeport, Conn., is making a unit receptacle, combining switch plate and receptacle. It is made of molded composition in brown. The edges of the plate are beveled and the screw heads are covered with small buttons of the same material as the plate.

Meter Cabinet and Switch

The American Electric Switch Corp., Minerva, O., has placed on the market a combination meter cabinet and entrance switch for installations on the outside of residences. The

box is electrically welded and non-breakable glass is placed over the meter compartment. The box is claimed to be water proof.

Starters

A complete new line of D. C. motor starters for general purpose applications has been introduced by the General Electric Co., designed to provide definite time acceleration for constant—and adjustable—speed motors. The enclosing case cover hooks over two pins at the top of the box, and the bottom is held by a screw. Thermal overload protection is provided by means of single-coil relays designed for overload protection and having a thermal capacity to stand high inrush currents.

Plug Cap

The Cutler-Hammer Mfg. Co. is making a plug cap with an improved type of grip cord. Screwing down on a knurled collar wedges a fibre bushing tightly against the cord.

Switch

A new single-pole disconnecting switch has been placed on the market by General Electric Co., for outdoor service in voltages 7,500 to 154,000, with a minimum rating of 600 amp. It has large break distances, and is assembled on cemented cap-and-pin type insulators for either horizontal or vertical mounting. There is a positive blade latch which makes it impossible for the switch to be opened until tripped. The blade consists of two copper channel-sections mounted back to back to form a narrow truss.

Industrial Switch

The Wadsworth Electric Mfg. Co., Covington, Ky., has added several new items to its

line of switches. All the switches are provided with multiple concentric knockouts to accommodate from 3 to 4 different sizes of conduit.

Suspension Joint Fitting

A self-aligning suspension fitting conduit work has been placed on the market by The Adapti Co., Cleveland, O. The fitting is adaptable for use with all standard conduit fittings. It consists of a universal joint enclosed in a cast iron outer shell. The upper end carries an external thread to screw into the T fitting in the conduit run and the lower end carries an internal thread for the lighting fixture. The manufacturer claims it will permit the fixture to swing freely in any direction to the extent of 20 deg. or more.

Floor Receptacle

The Steel City Electric Co., Pittsburgh, Pa., recently placed on the market a small receptacle designed for use in hardwood floors

where the wiring is installed in rigid conduit or in flexible cable where it is not subject to water wash or mechanical strain. It is recommended to take the place of wall or baseboard outlets.

Manufacturers' Notes

The National Metal Molding Co. has changed its name to the National Electric Products Corp., Pittsburgh, Pa.

The Thomas and Betts Co. has moved its New York office to 15 Park Place.

The O. C. White Co., announces the appointment of James A. Vaughn as its representative in the Philadelphia territory. Mr. Vaughn represented Stanley & Patterson in the same territory for a number of years.

The Splitdorf Rol-Iron Co. has announced that D. B. Thompson has joined the sales department.

The Silvray Co., Inc., announces its removal to its new plant at 53 W. 14th St., New York.

The Chicago Steel Tank Co., 6400 W. 66th St., Chicago, Ill., announces the formation of an electric sales division with Clyde W. Lint, formerly sales manager for Paul W. Koch & Company, as manager. The company thus re-enters the direct sales field with a line of electrical conduit fittings which in the past has been marketed under private trade names of other manufacturers. The Burg Electric Sales Co., 32 Union Square, New York City, N. Y., and 1321 Arch Street, Philadelphia, Penna., is sales representative for the North Atlantic States.

The following changes, additions and promotions have taken place in the sales department of Chicago-Jefferson Fuse & Electric Company, Chicago, since its consolidation: L. E. Fuller becomes western sales manager; G. A. Shaver, sales manager; J. D. Benfield salesman New York and Pennsylvania territory; S. V. Evans, New York territory; E. Duffy Wisconsin and Michigan; A. J. Olson, Chicago; E. G. Schmitt, Ohio and West Virginia; E. A. Abbott, Oklahoma and Texas; H. R. Hosmer, Louisiana and Mississippi.

New Catalogues

The Arrow Electric Co., Hartford, Conn., has issued a number of new pages for its loose leaf catalog. Sockets, switches and receptacles are included.

The Crouse-Hinds Co., Syracuse, N. Y., has published a new bulletin of plugs and receptacles, containing descriptions of two methods of supplying electric power to portable apparatus.

The General Electric Co. has issued a new catalog of switchboard devices and disconnecting switches for indoor service.

The Sangamo Electric Co. Springfield, Ill., has issued a descriptive booklet of its new maximum demand meter and new watthour meter.

The Monitor Controller Co., Baltimore, Md., has issued a new price list of its motor starter, both standard size and junior size.

The Hart & Hegeman Mfg. Co., Hartford, Conn., has issued a new catalog of switches, sockets and receptacles.

The Benjamin Electric Mfg. Co., Chicago, has published a bulletin in colors describing a glass cover for reflectors.

A new bulletin of the Sorgel Electric Co., Milwaukee, describes air cooled transformers and gives prices.

Chicago Welcomes The Electragists!

ON BEHALF of the Convention Committee and Chicago members of the Association of Electragists, International, it gives me great pleasure to welcome all visiting Electragists to Chicago for the 1928 Convention.

This will be an unusual Convention in many ways. Greater in attendance, more important in the scope and effectiveness of its business sessions, and, we hope long remembered for the unusual entertainment arranged by the committee and for the natural recreational facilities afforded by our city. The entertainment features are scheduled not to interfere with the business sessions. The unique programs planned for the ladies by the Woman's Entertainment Committee are expected to induce a large attendance.

The Convention Committee appreciates the honor in having Chicago awarded the Convention, welcomes the privilege of having you as our guests and feels confident that the interests of The Association of Electragists, International, have been carefully guarded so that all will obtain the maximum in profitable and pleasurable relaxation.

L. E. Mayer

Chairman of the Convention Committee.

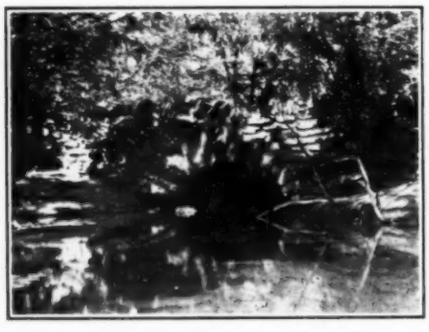
Chicago

CHICAGO began its remarkable history in 1803 with the building, on the edge of the wilderness, of Fort Dearborn. In 1812 fort and village were wiped out by an Indian massacre. In 1833 a re-established community, with fifty families, was incorporated. In 1871 fire swept the city, laying in ashes three and one-half square miles including the business district, rendering homeless 100,000 of a population of 300,000 and incurring a property loss of $200,000,000. Ere the ashes were cold the city was rising again. The holocaust found its recompense in a new city larger and more beautiful. It thrived amazingly and its progress blossomed forth in 1893 into the World's Fair, an exposition whose splendor has served as inspiration for Chicago's impressive civic enterprise of today.

Points of Interest in Chicago

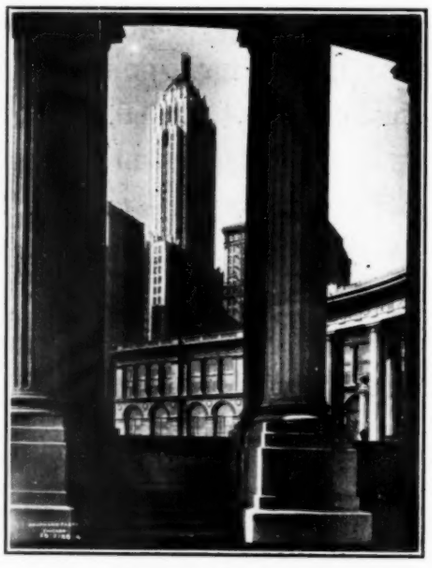
Washington Park: Located between 51st and 60th Streets, Cottage Grove and South Park Avenues. Contains 371 acres of beautiful trees, shrubbery, and flower gardens. Here is Lorado Taft's famous "Fountain of Time". Lagoon, bridle-path, conservatory with floral displays the year around. Sports are: tennis, picknicking, baseball, football, basket-ball, roque, bowling, archery, wading, flycasting. Refectory for meals and refreshments.

Lincoln Park: Among the many attractions at Lincoln Park are the conservatory, noted for its perfect specimens of tropical vegetation; gaily-colored botanical gardens; statues of internationally-celebrated figures including St. Gauden's famous statue of Abraham Lincoln. Here also is the Academy of Sciences, Lincoln Park Yacht Club and a refectory serving meals. Sports are: Golf on the 9-hole course at the north end of the park, boating in the lagoons, picknicking, horseback riding, swimming, tennis, baseball.



Humboldt Park: Located between North Avenue, Augusta Street, California and Kedzie Avenues. It contains rose gardens, water court, pergolas, music court, and fish hatchery.

White City Amusement Park: 63rd Street and South Park Avenue. A large summer amusement park with thrilling rides, chutes, fun houses and countless other attractions. The Coney Island of Chicago's South Side. Dancing and roller skating the year around.



Chicago Public Library: View from the peristyle in Grant Park, showing the Pittsfield Building in the background. The library contains 1,099,711 volumes and many manuscripts, newspapers, magazines and art works.

Clarendon Beach: Lake Michigan at Sunnyside Avenue. Owned and operated by the city. Open all summer, days and evenings, and brilliantly flood-lighted for night bathing.

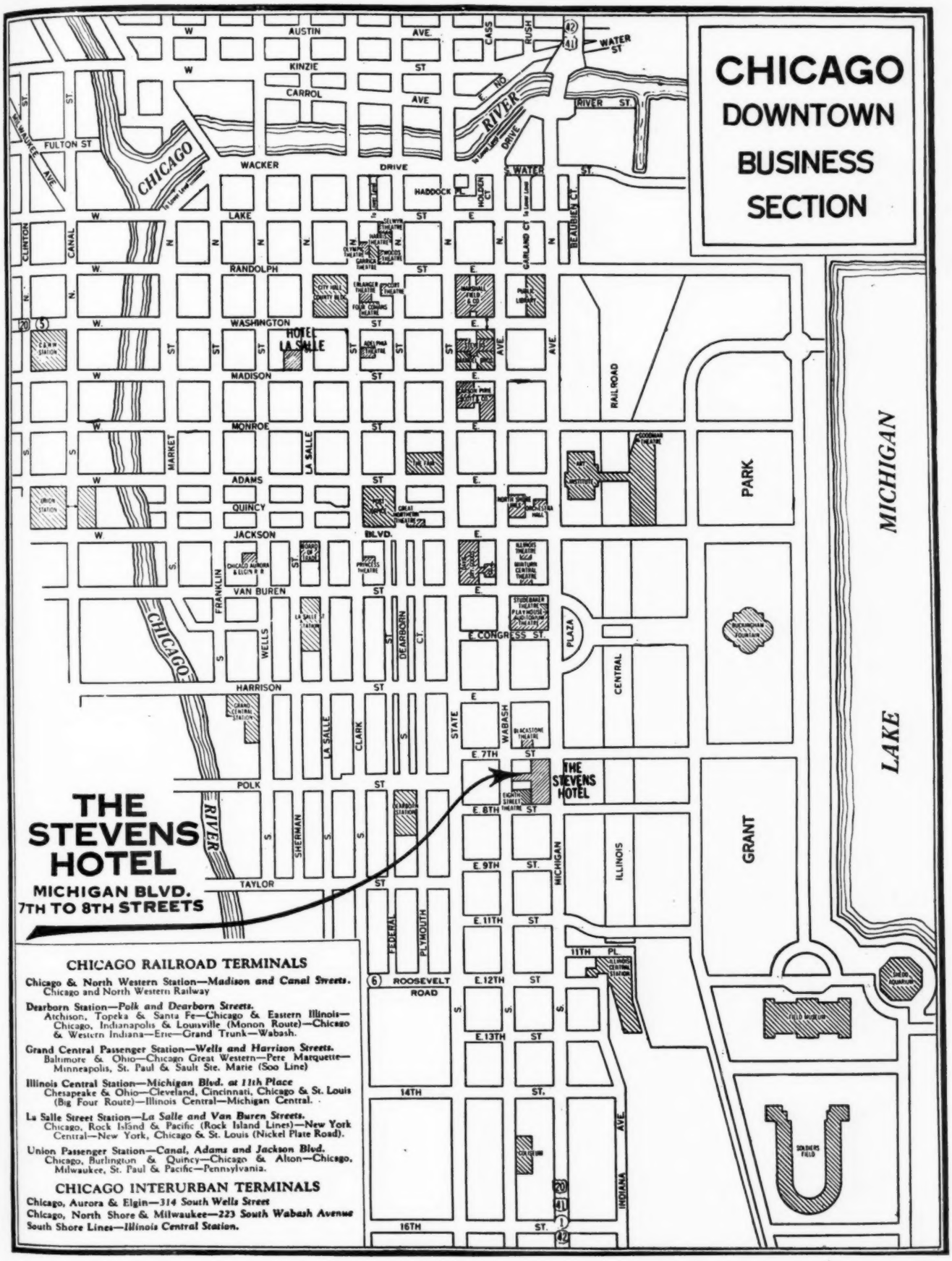
The Loop: This is the famous heart of Chicago where innumerable points of interest are located. You will find a wealth of amusement places, theatres, restaurants, and other varied attractions. On La Salle Street (called the Wall Street of the Middle West) are located some of the largest banks and investment houses in the world, including the Federal Reserve Bank, center of the Fifth Federal District. The Board of Trade Building at La Salle and Jackson, containing the famous "Wheat Pit", is the scene of world grain transactions. The busy Stock Exchange is located in the Rookery Building at La Salle and Adams Street. Visitors are welcome at both the Board of Trade and Stock Exchange. On State Street, and side streets, also outside the Loop on Michigan Ave., is centered the greatest retail dry goods section in the world, including the world's largest retail store. On display in this section is merchandise of every description, domestic and imported, valued into the hundreds of millions. Also in the Loop district are many famous skyscrapers, the highest of which is the Morrison Hotel, towering 42 stories above street level. Occupying a full city block at Clark, Washington, La Salle and Randolph Streets is the large building housing the County Court House on one side and the City Hall on the other, and in which are held numerous interesting courts of law. The Federal Building, housing the Chicago Post Office, occupies a full city block bounded by Adams, Dearborn, Jackson and Clark.

Newberry Library: Walton Place near North Clark and North Dearborn Streets. Open daily except sundays and legal holidays. Contains 403,893 volumes and pamphlets. The museum contains many valuable manuscripts, both originals and copies, also a fine collection of rare books, including illuminated manuscripts and other rareties of great interest.

The Chicago Historical Society: North Dearborn and Ontario Streets. Open week days from 9 a. m. to 5 p. m. except Saturday afternoons in summer; open Sundays from 2 to 5 p. m. The library here contains 50,000 volumes, many original manuscripts, maps, early newspapers. The museum contains portraits, models, personalia and mementos of historical interest.

(Continued on page 71)

Chicago Stockyards


CHICAGO
DOWNTOWN
BUSINESS
SECTION
THE STEVENS HOTEL
MICHIGAN BLVD.
7TH TO 8TH STREETS
CHICAGO RAILROAD TERMINALS
Chicago & North Western Station—Madison and Canal Streets.
Chicago and North Western Railway
Dearborn Station—Polk and Dearborn Streets.
Atchison, Topeka & Santa Fe—Chicago & Eastern Illinois—Chicago, Indianapolis & Louisville (Monon Route)—Chicago & Western Indiana—Erie—Grand Trunk—Wabash.
Grand Central Passenger Station—Wells and Harrison Streets.
Baltimore & Ohio—Chicago Great Western—Pere Marquette—Minneapolis, St. Paul & Sault Ste. Marie (Soo Line)
Illinois Central Station—Michigan Blvd. at 11th Place
Chesapeake & Ohio—Cleveland, Cincinnati, Chicago & St. Louis (Big Four Route)—Illinois Central—Michigan Central.
La Salle Street Station—La Salle and Van Buren Streets.
Chicago, Rock Island & Pacific (Rock Island Lines)—New York Central—New York, Chicago & St. Louis (Nickel Plate Road).
Union Passenger Station—Canal, Adams and Jackson Blvd.
Chicago, Burlington & Quincy—Chicago & Alton—Chicago, Milwaukee, St. Paul & Pacific—Pennsylvania.
CHICAGO INTERURBAN TERMINALS
Chicago, Aurora & Elgin—314 South Wells Street
Chicago, North Shore & Milwaukee—223 South Wabash Avenue
South Shore Lines—Illinois Central Station.

The Electragist, August, 1928.

Welcome to Chicago
An Invitation
This is a special invitation to the Electragists attending the Chicago Convention—August 6th-10th—to visit the Home of Inland "Snow-White" Glass where they may see the actual production of Illuminating Glassware.
Appointments are not required. For details in connection with your visit please write or phone.
This intensely interesting trip through a modern Glass Plant will also be of special interest to the ladies.
INLAND GLASS WORKS, INC.
6101 W. 65th Street, Chicago, Illinois
Phone Hemlock 7470
Inland
THE LARGEST IN THE MIDDLE WEST

The Art Institute: On Michigan Boulevard opposite Adams Street ranks among the best art galleries in the country, and contains vast stores of masterpieces of painting, sculpture, furniture, tapestry, and architecture both of the ancient and modern schools.

The John Crerar Library: 86 East Randolph Street. This is one of the foremost scientific and technical reference libraries in the country, having about 300,000 volumes and 300,000 pamphlets devoted to the social, physical and medical sciences and their application.

Municipal Pier: Located at the foot of East Grand Avenue, 3,000 feet long and 292 feet wide. Cost $4,000,000 to build. For summer recreation purposes and for docking of lake boats. Outer end contains a concert and dance hall, space for children's amusement, and refectory. The finest view of Chicago's skyline is obtained from this point.

Soldiers Field Stadium: At the south end of Grant Park and adjoining the Field Museum. Here are carried out pageants, rodeos, parades, athletic contests and festivals of all kinds. Seats 55,000 persons. Architecture of the Greek Classic style.

Wrigley Building: Seen through the open space of the Link Bridge on Michigan Boulevard. This bridge is its major connecting artery between the north and south sides of the city.

Other Places To See In or Near Chicago

FIELD MUSEUM OF NATURAL HISTORY
Grant Park at Roosevelt Road
Open daily, including Sundays

CITY HALL and COUNTY BUILDING
Clark and Washington Streets

FEDERAL BUILDING
Clark and Adams Streets

ACADEMY OF SCIENCE
Lincoln Park

ZOOLOGICAL GARDENS
Lincoln Park

STOCK YARDS
Halsted and Root Streets

BOARD OF TRADE
La Salle Street and Jackson Blvd.

PRODUCE MARKET
Racine and 15th Streets

TRIBUNE TOWER
431 N. Michigan Avenue

AUDITORIUM TOWER
Congress St. and Wabash Ave.

TEMPLE BUILDING
Clark and Washington Streets

CHICAGO HISTORICAL SOCIETY
632 N. Dearborn Street

FEDERAL RESERVE BANK
Jackson Blvd. and La Salle St.

ILLINOIS MERCHANTS TRUST COMPANY
Jackson Blvd. and La Salle Street

INTERNATIONAL HARVESTER COMPANY
Blue Island and Oakley

NORTHWESTERN UNIVERSITY
Evanston, Ill.

RACINE PARK SUMMER OPERA
Racine, Ill.

YERKIS OBSERVATORY
Lake Geneva, Wisconsin

GREAT LAKES NAVAL TRAINING STATION
Great Lakes, Ill.

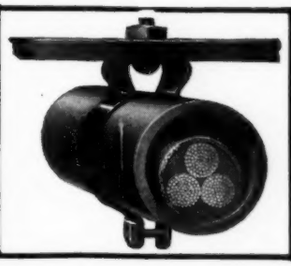
FORT SHERIDAN
Fort Sheridan, Ill.

SANITARY CANAL SYSTEM
Willow Springs or Lockport, Ill.

STEEL MILLS
Gary, Indiana

Minerallac

Cable and Conduit Hangers



Japanned or Galvanized

"Makes the Job Look Right"

The Minerallac Hanger makes it possible to run Conduit or Cable rapidly and in a workmanlike manner.

MINERALLAC ELECTRIC COMPANY

25 North Peoria Street **Chicago, Illinois**

A MESSAGE *fro*

This is the factory that is back of THE WADSWORTH LINE

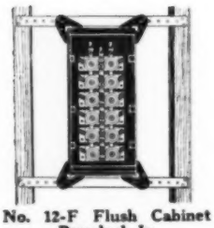
We Will Have a Complete Exhibit of WADSWORTH SAFETY ELECTRIC SWITCHES at THE ELECTRAGIST CONVENTION, STEVENS HOTEL, CHICAGO

AUGUST 6 to 10
Booths 43 and 44

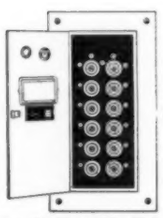
We Extend to You a Cordial Invitation to Visit Us

THE WADSWORTH ELE

COVINGTON,



No. 12-F Flush Cabinet
Roughed In
Note Method of Hanging

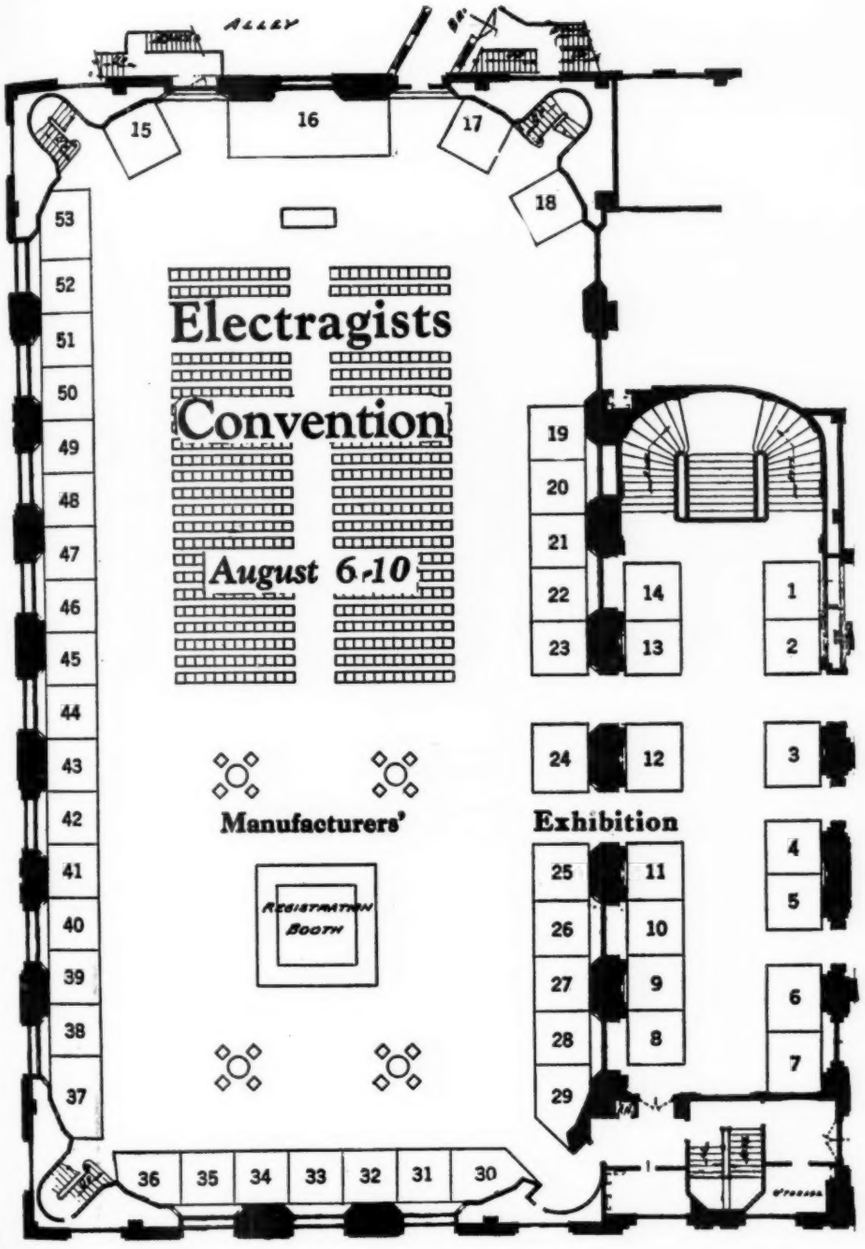


No. 12-F With Trim
In Place

No 2863
Industrial Type

No. 3813
Motor Starter

Exhibitors



3	Frank Adam Electric Co.
49	All-Steel-Equip. Co.
14	The American Electric Switch Corp.
4	American Steel & Wire Co.
41	Appleton Electric Co.
15	Automatic Electric, Inc.
35	Benjamin Electric Mfg. Co.
13	Gus Berthold Electric Co.
17	The Black & Decker Mfg. Co.
7	The Bryant Electric Co.
37 & 38	Bulldog Electric Products Co.
22	Bussman Mfg. Co.
6	Century Electric Co.
19	Chicago Jefferson Fuse & Electric Co.
18	Chicago Steel Tank Co.
36	Clayton Mark & Co.
46	Clemson Bros. Inc.
47	S. H. Couch Co.
51-53	Crouse-Hinds Co.
9	Curtis Lighting, Inc.
2	Edwards & Company, Inc.
8	Erie Malleable Iron Co.
23	French Battery Co.
39-40	Graybar Electric Co.
16	General Electric Co.
42	Harvey Hubbell, Inc.
48	Johns-Manville, Inc.
32-34	National Electric Products Corp.
45	The Okonite Co.
11	The Packard Electric Co.
10	Square D Co.
30	Taplet Mfg. Co.
1	Tork Clocks, Inc.
5	Triangle Conduit Co., Inc.
50	Triplex Washing Machine Corp.
21	The Trumbull Electric Mfg. Co.
20	Van Cleef Brothers
43 & 44	The Wadsworth Elec. Mfg. Co., Inc.
24-29	Westinghouse Electric & Mfg. Co.
12	The Wiremold Co.
31	William Wurdack Electric Mfg. Co.

Build Good

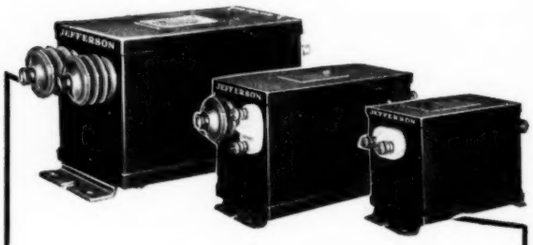
Known Everywhere

Old in number of years, high in quality, dependable in performance: these are a few reasons why Union Fuses are known and accepted everywhere.

Union "Renewables" are made in knife-blade and ferrule types—the knife-blade type for the larger capacities, one of which is shown. In the ferrule type, the links are furnished bent at one end to make renewal easy and quick. In the knife-blade type the ends of the fusible link are notched so that nuts which hold them need be loosened only slightly to remove or replace the link.

Union Casings withstand more blowouts. Because Unions are worth more, they really cost less.

UNION FUSES



Get Your Share of This New Business

Gaseous Tube Signs are growing more popular every day and each sign requires one or more transformers. Assure the satisfaction of every customer by installing Jefferson Transformers.

They are designed especially for this service and all problems have been overcome—assuring attractive displays every hour, through fair, stormy, hot, or cold weather.

Made in sizes and capacities for every need.

JEFFERSON
Gaseous Tube Sign
TRANSFORMERS

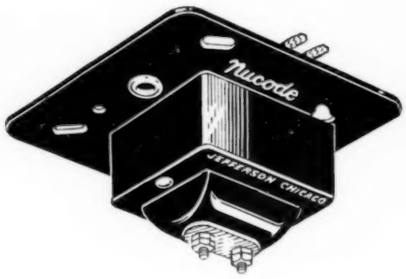
The UNION-GEM-JEFFERSON Line is Sold Through Wholesalers

The Jefferson-Nucode Transformer Saves Time and Material

The Jefferson "Nucode" permits the installation of a transformer and drop light in one outlet box. Thus it saves one box, several inches of conduit, and the time required for installing extras.

The Nucode fits all sizes of boxes and thus saves carrying a large stock of various sizes.

The Nucode is a quality product throughout—especially well insulated—and efficient.



UNION - GEM

Will by Using Products of Unquestioned Reputation

A Reputation Built by Service

Union Fuses, Gem Powerlet Malleable Conduit Fittings, Gem Switch and Union Outlet Boxes, and Jefferson Transformers are accepted everywhere because of their reputation—dating back to the infancy of electrification.

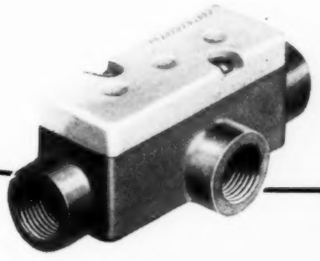
This uncompromised reputation of Union-Gem-Jefferson Products makes their use an accepted sign of the quality of the work you do.

And Union-Gem-Jefferson Products always make good—always protect your good-will.

They are built with service constantly in mind, yet they cost no more than the others—and are designed to save your time by making installation easy.

New Catalog--

There is a fuse, conduit fitting, switch and outlet box, or transformer in the Union-Gem-Jefferson Line which will fill every need arising in your business. A new complete catalog No. 33 gives detailed information. Write for your copy.



A Complete Line of Malleable Fittings

Gem Powerlets are the original conduit fittings cast from malleable iron. Heavily galvanized, they are rustproof.

Cast in one piece, Gem Powerlets have no seams, welds or inserts, and because of the toughness of malleable iron they won't crack.

Hubs are threaded accurately, guaranteeing waterproof joints and elimination of high resistance points in the conduit run.

Powerlets are easily, quickly installed because they provide plenty of room for wiring, lie flat and the assembling screws don't drop out and get lost.

GEM POWERLETS

Chicago-Jefferson Fuse & Electric Co.

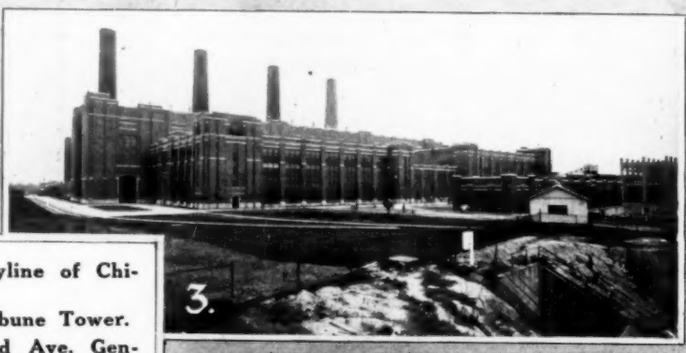
1503 West 15th Street, Chicago, Ill.

JEFFERSON

1.

Chicago

2.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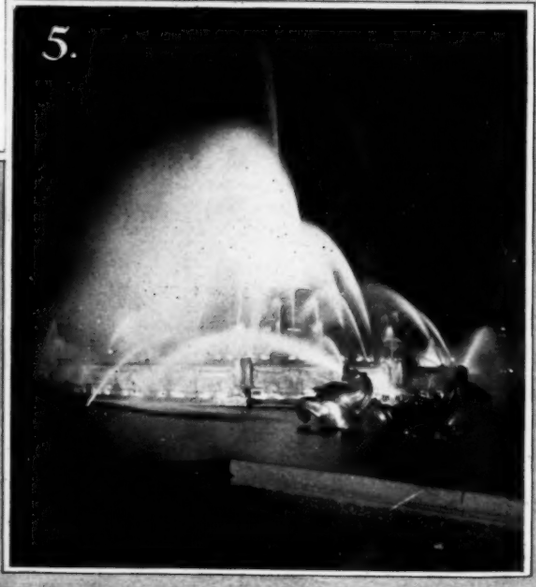
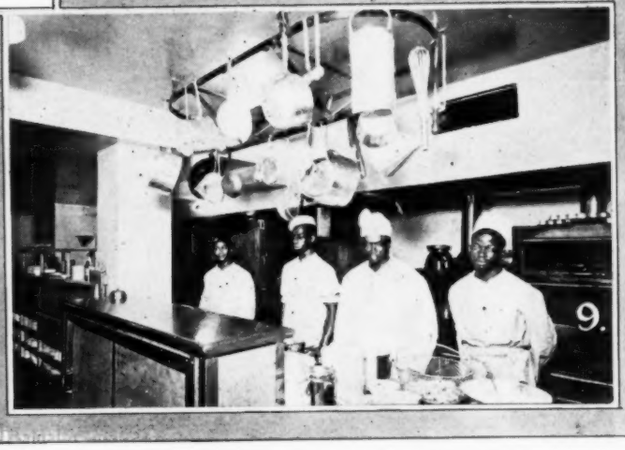
1. The Skyline of Chicago.
2. The Tribune Tower.
3. Crawford Ave. Generating Station, Commonwealth Edison Co.
4. Theatre District on State Street.
5. Buckingham Fountain Illuminated at Night.

4.


5.

in pictures

6. Aerial View of Chicago.
7. Wrigley Building and Annex.
8. The Brightest Lighted Street—State St.
9. All-Electric Kitchen, Chicago North Shore and Milwaukee Railroad Terminal.



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A Symphony of Industry---Chicago

The Great Central Electrical Market—a Manufacturing Center—a Distributing Center

By WM. T. BIESEL

NO one has written the symphony of industry, yet it is the keynote of the world's material existence today. Chicago is its initial source. How Chicago, a leading center for the production and distribution of electric goods and equipment, maintains this leadership from which flows the broad development of prosperity whose tones and rhythm are echoed by the walls of every home is too big a project to be more than briefly sketched in these pages.

Electrically the Chicago region stands first among the metropolitan areas of the world. Within the city itself live 2.6 percent of the nation's population, yet they are served by 4.7 percent of the nation's electric output, ride on transportation lines representing 4.9 percent of the nation's investment in electric transportation, and use 4.9 percent of the nation's telephones. Chicago is a most important financial center for the electric power industry; 35 percent of all public utility securities sold in this country are underwritten by investment houses of the city. On October 29 all stocks listed on The Chicago Stock Exchange were valued at $5,285,299,374. Of this amount $2,119,069,732, or 42 percent were utility stocks.

Within this favored area electricity supply companies, electric transportation companies and electric communication companies render efficient service to a population of 4,000,000 people. The total generating capacity of all central stations is more than 1¾ million horsepower, and additional equipment already ordered will raise the total above 2,000,000 horsepower. There are more than 160,000 employes in the electrical industry in this district, and over 425,000 people, equal to 1/7 of Chicago's population, are directly or indirectly dependent upon it.

The value of wiring, equipment and appliances in the Chicago region is placed at $930,000,000 and the capital invested in all electrical plants and equipment aggregates $1,080,000,000. Electrical manufacturers do an annual business of $285,000,000, the annual income of the public utilities is $243,400,000 and the value of electrical products made elsewhere and sold here is $75,000,000, the total gross business of the industry in the Chicago area thus amounting to $603,400,000 for the year.

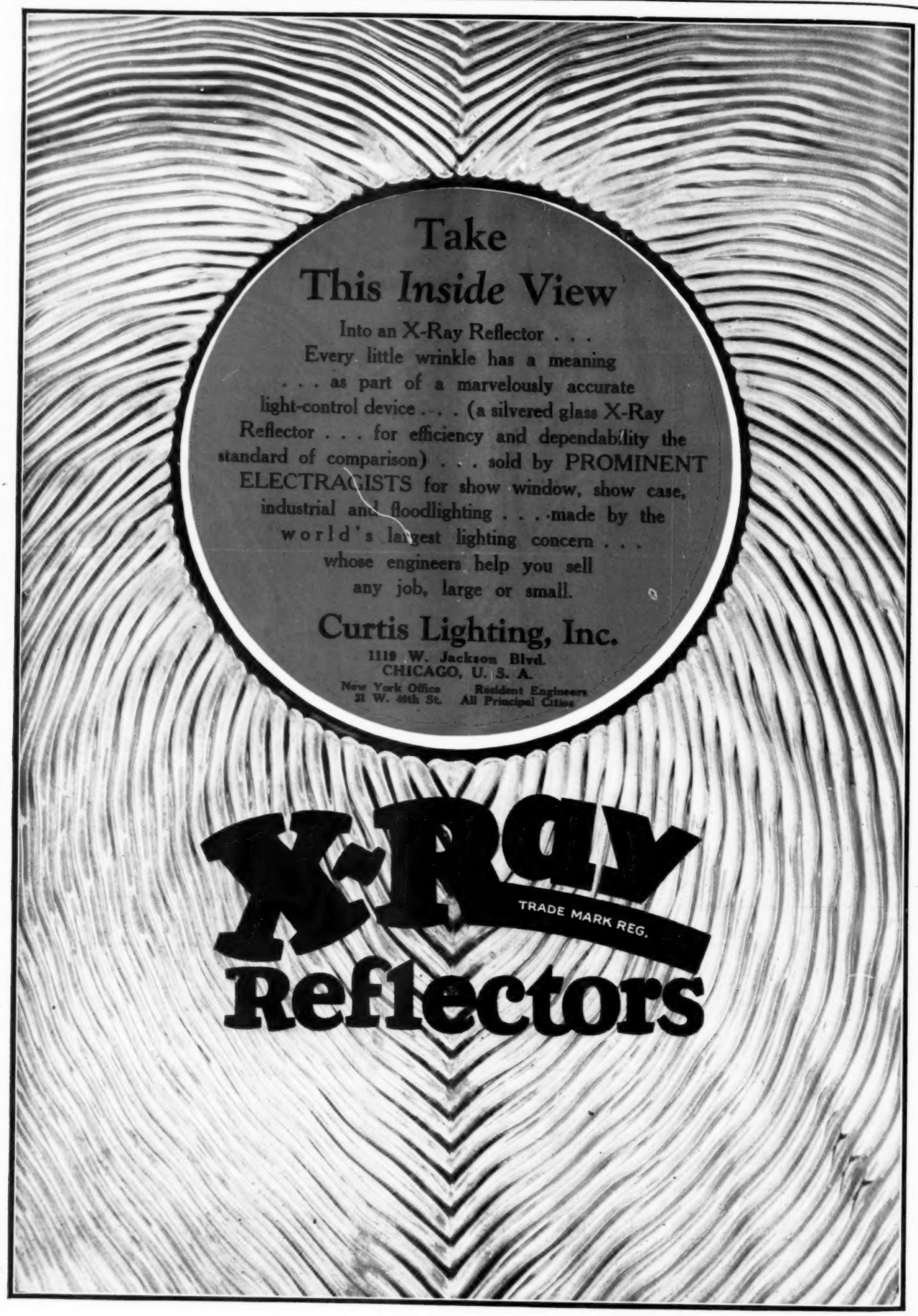
One of the important divisions of the electrical industry consists of those concerns engaged in the wholesale and retail distribution of electrical equipment and supplies and the installation of wiring and equipment. In the city itself 668 establishments do a volume of business in excess of one-third of a billion dollars. These figures include the total output of the factories together with the sales of the wholesalers and retailers.

Illinois ranks first among all states in the number of persons employed in electrical manufacture, with 53,571 and second only to New York in total number of manufacturers, with 212. Approximately $206,000,000 is invested in plants and equipment.

The adequacy and quality of service rendered by the electricity supply companies in the Chicago region is indicated by the average annual per capita consumption of electricity in Chicago of 1,029 kilowatt hours, compared with a general average for the United States of 600. Practically all of the city's energy is supplied by the Commonwealth Edison Company, the world's largest steam operated central station system, which has a total generating and storage battery capacity of 1,400,000 horsepower. The company serves 883,000 customers, has assets in excess of $314,000,000, and gross operating revenues for the past year $71,628,560.

Public Service Company of Northern Illinois serves the suburban territory adjoining the City of Chicago. Pioneer in superpower development, the company has been an important factor in the remarkable increase of industry and population in this territory. Today the company serves 286 communities and over 359,000 customers. Operating revenues for the past years were in excess of $26,000,000, and assets approximately $152,000,000.

By interconnection of stations and constant addition of larger, more economical generating units, the electricity supply companies keep pace with the needs of the Chicago region. The Crawford Avenue Station, with a capacity of 324,000 K.W. is now being increased by installation of a 100,000 K.W. unit for service this fall. The State Line Plant destined to be the world's largest steam electric station, is under construction at the Indiana-Illinois state line. A first unit of 200,000 K.W., the largest electric generator ever made, has already been ordered. Plans are made for other great central stations, and all large sources of supply are being interconnected by a network of high-power transmission lines converging on Chicago and forming the world's most extensive superpower development.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Every little wrinkle has a meaning
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How the Electric Association is Cooperating in Chicago

By R. BOURKE CORCORAN
Manager, The Electric Association, Chicago, Ill.

ALL branches of the electrical industry in the Greater Chicago area are very happy to welcome the electrical contractors and dealers of the United States and Canada, and their wives, to the 28th Annual Convention of the Association of Electragists, International. The united effort of all groups of the industry nationally to support this Convention and encourage the attendance is a further step in the industry's general program of development and co-operation.

With the reorganization of the Society for Electrical Development, there has come a very strong desire on the part of the jobbing, manufacturing, and utility groups to support the Association of Electragists, International, by assisting to build up its membership so that it will be truly representative of the electrical contractor and dealer branch of the industry.

The Electric Association, Chicago, through its membership, representing all groups of the industry, is pleased to co-operate in sponsoring this convention in our great city, August 6 to 10 at the Stevens Hotel. The business development plan of the electrical industry which will shortly be launched under a program to be announced by the Industry Sales Conference offers every reason for the contractor portion of the industry to organize itself in a most efficient manner so as to be ready to lend its aid and to participate in a just portion of this new business.

Surely the endorsement of the Association of Electragists, International, by the spokesmen of the National Electric Light Association, National Electric Wholesalers' Association and the National Electric Manufacturers' Association should arouse in every contractor and dealer in the United States and Canada an interest in his own Association so that he will want to attend the conventions and join in his own group to do his full share in this very important new competition between industries.

Aims and Purposes of the Electric Association

1—To develop and improve the service rendered the public by the electrical industry.

2—To develop a closer co-operation and understanding among electricity supply companies, telephone and electric traction companies, telegraph companies, contractor-dealers, electrical contractors, manufacturers, manufacturer's agents, jobbers, engineers, and other persons and bodies interested in the electrical industry.

3—To conduct suitable educational activities with the view to encouraging the public toward a more intelligent use of electricity and its application.

4—To inform the public as to the importance of the service rendered by electricity in the development of public welfare.

5—To endeavor to bring about improvements of method in all branches of the industry.

6—To encourage the practice of good business methods in the industry, and to raise the standards of electrical practice by so informing the public that they will appreciate and demand the best in materials, workmanship, engineering and applications.

7—To give and conduct demonstrations, exhibitions and displays, and to acquire, hold, maintain, operate, lease and dispose of, buildings and movable property for such purpose, or for such other purposes as may advance the objects of the Association.

8—To endeavor to obtain fairer treatment for invested capital and a more favorable attitude on the part of the public toward electrical development.

9—To keep closely in touch with all public matters pertaining to electrical problems, that all business organizations, municipal, state and federal authorities may know that this Association is a responsible body and capable of handling intelligently subjects pertaining to electrical matters.

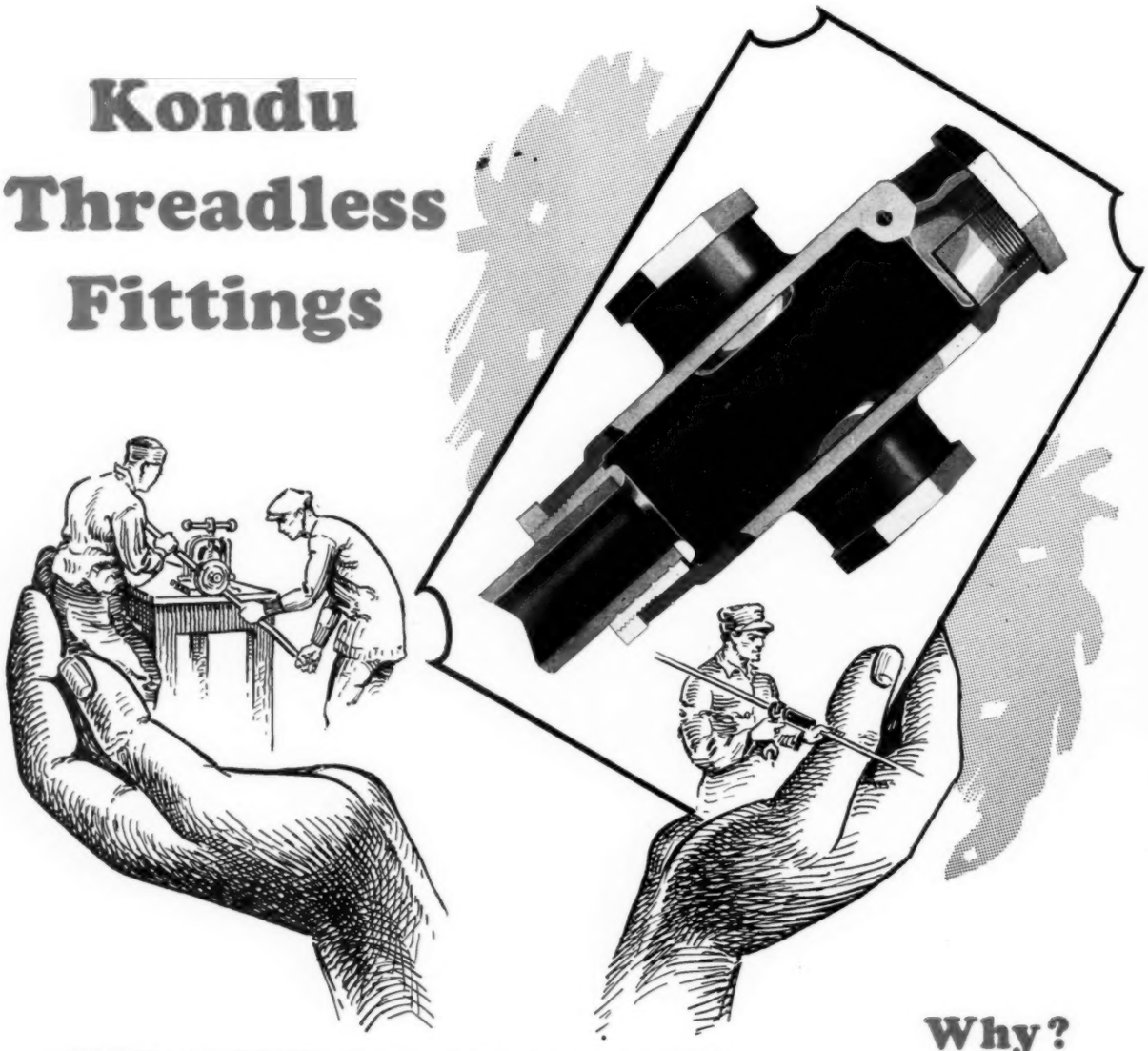
The Electric Association was organized as an all industry, non-profit organization in September of 1925. The objects motivating the 101 charter members who attended the first meeting, given in the panel on this page and incorporated in the Constitution, clearly delineate the ideals and purposes of this organization. It is a grouping together of all business interests in any way engaged in the electrical industry in the Chicago territory. Through this association they are working cooperatively for the benefit of the public and the entire industry.

The membership of the Electric Association is composed of eight important groups — electrical contractor dealers, contractors, supply jobbers, manufacturers, radio manufacturers, the electric light and power, electric transportation, telephone and telegraph companies of the Chicago region, lighting equipment manufacturers and members-at-large.

The members are drawn from those concerns and individuals not directly engaged in the electrical industry, yet concerned in its growth and progress. It represents all those who are indirectly connected through their vocation, services or study. Included in this group are lawyers, investment bankers, advertising agencies, government officials, educational institutions and manufacturers.

PROGRESS DEMANDS

Kondu Threadless Fittings



KONDU Threadless Fittings were designed to make **your** job easier. The method of installing a Kondu Fitting is known to every tradesman who has ever installed conduit or BX. Tighten a lock-nut and the job is done. Simple isn't it? Made of "Certified" Malleable Iron, a **KONDU** fitting is practically indestructible whether you use gas pliers on the small sizes or a Stillson in larger sizes. **KONDU** will not crack.

KONDU is the only fitting with which you can add or take out, outlets, without "tearing" out the installation.

Visit our booth, No. 8, at the Convention and get your sample catalog and let us demonstrate why **KONDU** is an essential part of all electrical installations.

Why?

No threads to cut.
Easily installed.
Less tools required.
Cuts your overhead.
100% salvage.

Erie Malleable Iron Co.

Kondu Division, Erie, Pa.

KONDU carried in stock by leading Electrical Jobbers

Engineering the Home Wiring

How Chicago Contractors Increase the Number of Outlets in Each Job

By J. WALTER COLLINS,
Secretary, Electrical Contractors' Association, Chicago

A RECENT survey of several thousand homes in Chicago reveals a very surprising fact; the number of outlets for the use of electricity is far below the average of even our smallest towns. Why such a condition should prevail in this city, where so much effort has been put forth to sell the building public on the value of adequate wiring, appeared to be a poser. But the condition did exist, and it is not a condition restricted solely to Chicago.

After a thorough investigation it was found that contractors doing this class of work had developed a practice of inducing owners and builders to leave out work originally provided for in the plans, or had failed to call their attention to cases where necessary outlets had not been provided for.

J. Walter Collins

The officers of the Electrical Contractors' Association called a meeting of contractors to discuss the subject and to provide some method for eliminating this practice. The meeting was well attended and the contractors expressed a desire to do their share. They adopted a motion to assess any contractor who continued the policy of eliminating outlets, five dollars ($5.00) per outlet for the first offense, doubling this amount for each subsequent offense.

Attention was also called to the fact that very little effort had been put forth by them to secure modern installation. Through this lack of effort our members, together with every other branch of the industry, were being deprived of a large amount of business. The contractors were informed that the wiremen on the installation would be asked to look over plans of the job and where it was found that the job to be installed had been cut or where necessary outlets had been left out, they would call it to the attention of the owner or builder and attempt to have the job properly wired. Where they find a contractor has recommended the reduction of work, the matter is reported to the officers of the association.

The schedule of outlets as here shown is considered by us to be the minimum requirement for proper wiring.

If we are to make a success of our efforts to have a modern installation specified, we must be familiar with the use of electricity in each room of the house and the proper kind and location of the outlets that will conveniently serve this use. We must have a logical reason for each outlet, not that other buildings have them or because of a certain schedule, but because of its practical use in each individual case.

To illustrate this point, let us consider the living room of the average building.

What is the function of the living room and what can electricity do to accomplish it? The living room serves two very distinct purposes. First, the brilliant social stage of the home and next but not least, the intimate home convenience and comfort. To accomplish both of these features is a very simple task, if we would consider how the average housewife plans for each feature. In the first place we must provide sufficient outlets to allow any or all pieces of furniture to be located without limit. This means that floor and table lamps must have convenience outlets available at all points in the room. The average length of cords for portables is eight feet, so, if we place convenience outlets twelve feet apart, keeping in mind however that we cannot have cords in doorways, we have amply taken care of that feature and Mrs. Housewife can "set the stage" as often and as differently as she sees fit.

The use of portables casts very gloomy shadows on the walls and ceilings and is very objectionable. The use of wall brackets, properly placed, will correct this defect and can usually be accomplished by the use of six of these outlets. Taking into consideration that in many homes, one of the four sides is mostly taken up with windows, we space two of these brackets on each of the other three walls. There have been some objections to wall brackets by reason of the inconvenience of turning on and off each of these fixtures. A switch at the room entrance will overcome that fault.

The center outlet in living rooms seems to be the most debatable outlet in the home at the time of plan-

(Continued on Page 98)

12 Months of Progress!

Since the last Convention of the Association of Electragists, held in St. Louis a year ago, the Wm. Wurdack Electric Mfg. Co., has made a record of remarkable progress.

During these twelve months—

—A new, Model Factory has been completed and occupied.

—The number of Sales Offices has been greatly extended, now covering all principal cities.

—Production has been materially increased, to take care of the growing demand for Wurdack products.

—A new and comprehensive type of Catalog has been issued, covering everything in this line.

—Increased Factory Stocks have been accumulated to give better and quicker service.

This is, in brief, the year's story of the fastest-growing manufacturing organization in the field of Electrical Control Devices.

Be Sure to Visit our Exhibit
Booth 31, Stevens Hotel
during Electragists Convention

SWITCHBOARDS, PANELBOARDS, STEEL CABINETS, SWITCHES, REMOTE CONTROL THEATRE SWITCHBOARDS AND APPARATUS FOR ELECTRICAL DISTRIBUTION AND CONTROL.

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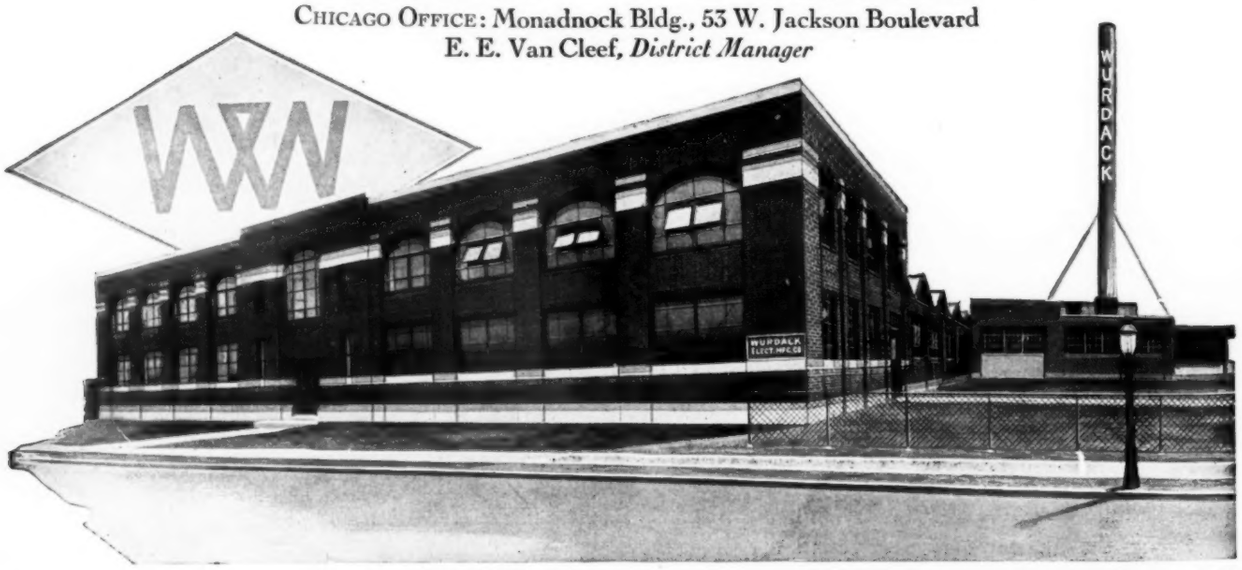


RACO New Products

Wall Bracket Boxes

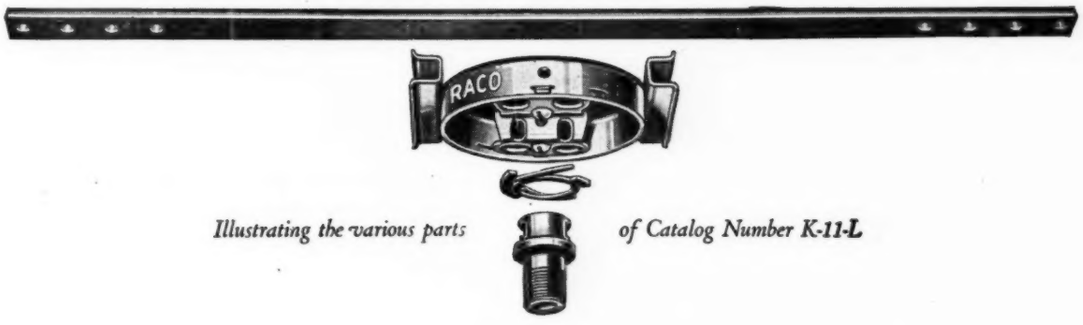
(Patents Pending)

The perfect mounting for ALABAX fixtures, and all other types of Wall Brackets. The sliding Fixture Bridge is fully adjustable and can be clamped in any position.

Catalog No. MF —*(illustrated)* . . . . . **for Old Work**
Catalog No. MF-X—*(with extended ears)* **for New Work**

Kwikset Combinations

(Patented March 18, 1913—Others Pending)



Illustrating the various parts of Catalog Number K-11-L

A new type of box-and-bar combination, with all parts permanently assembled, and yet instantaneously adjustable for position. Furnished with all types of ceiling boxes—with or without lath supports welded to the box.

Be sure to see the RACO exhibit
.....Room 1700—Hotel Stevens.....
during the Electragists' Convention

ROACH-APPLETON MFG. COMPANY

3440 North Kimball Avenue - CHICAGO **45 Murray Street - NEW YORK**

Engineering Home Wiring

(Continued from page 93)

ning and if left out after the house is in use is the most regretted omission. If the family were the only persons to use this room, it would be an excellent idea to leave out the center outlet, but for the social gathering it is indispensable. Brilliant lighting can do as much to co-ordinate the spirits of jollification such as music, conversation or even the festive highball. If games are played it is impossible to properly illuminate tables so that all may have sufficient and properly directed light when portables are used.

It is a fact that we buy fine furnishings for our personal gratification and we all get a measure of satisfaction in the admiration expressed by guests. Sufficient light is necessary that the minute details may be readily observed. This feature alone should prompt the use of a center fixture.

The fireplace, which has been such in name only due to the high efficiency of steam or hot water heat, will undoubtedly have some one of the many luminous grates and an outlet should be placed conveniently inside the enclosure.

There are numerous types of candle-sticks and other beautiful ornate luminars for the mantel place that a convenience outlet set flush in the top will make possible their use without unsightly long cords run from wall outlets.

Each room in the house can be considered in like manner. Confine your argument to what use can be made of the installation, for the public is not particularly interested in the extent of the installation from any other viewpoint.

ROOMS	Size of Room	Ceiling Outlets		Wall Lt. Outlets		Switches—1 Way		Switches—3 Way		Conv. Outlets	
		Required	Planned	Required	Planned	Required	Planned	Required	Planned	Required	Planned
Porches, each		1		or 1		1				1	
Entrances, each		1		or 1		1					
Vestibule		1		or 1		1					
Lower or Entrance Hall		1		or 1				2		1	
Living Room		1		2		2		or 2		3	
Dining Room		1				1		or 2		2	
Pantry		1		or 1						1	
Kitchen		1				1		or 2		2	
Upper Hall		1		or 1				2		1	
Passage Halls (each)		1		or 1				2		1	
Bath Rooms (each)		1		1		1				1	
Sleeping Room No. 1		1				1				2	
Sleeping Room No. 2		1				1				2	
Sleeping Room No. 3		1				1				2	
Sleeping Room No. 4		1				1				2	
Attic		1		or 1		1		or 2			
Cellar		2				1		or 2			
Laundry		1				1				2	
Garage		1				1		or 2		1	
Reception Hall or Music Room		1				1		or 2		2	
Library		1				1		or 2		2	
Sun Room		1				1		or 2		2	
Den or Amusement Room		1				1		or 2		2	
Breakfast Room or Nook		1		or 1		1				1	
Sleeping Porch		1				1				1	
Servants' Sleeping Room		1		or 1		1				1	
Lavatory		1		or 1							
Closets (each) Over 6 sq. ft. Floor Area		1		or 1							
Each enclosed Space or Attic		1		or 1							
Each enclosed Space in Cellar		1		or 1							
Open Stair Landing Over 40 Sq. Ft. Floor Area		1		or 1						or 1	
Closed Stairs		1						2			
Mantel				2						or 1	
Kitchenette		1		or 1							
Dressing Room		1		or 1		1				1	

Minimum Specification for Modern Home Wiring

Better Than Ever
and a Big Price Reduction

IDEAL Universal Wire Connectors

One Size Fits All Common Wiring Joints

Effective August 1, 1928, the Ideal Universal Connectors are available to contractors at a greatly reduced price, giving contractors an additional important reason for adopting this big time and labor saving device.

Ideal Universal Wire Connectors contain a copper coated tapered steel spring with a current carrying capacity about equal to the wires to be joined. This threads the wires, making a positive contact between them, and acts as a current carrying sleeve. Stronger, quicker, better and more economical than a solder and tape joint.

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